THE METAL INDUSTRY
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THE RECOVERY OF COPPER FROM SCRAP.

The prevailing high prices for all the nonferrous metals have led to unusual activity in the scrap market. Scrap producers are eager to realize on their waste metal, and among the scrap refiners competition is keen for the purchase of raw material. Copper is receiving its due share of attention, and in view of the large proportions which the copper and brass industries have assumed, some care is necessary in handling the ever-increasing traffic in copper and brass scrap.

The smaller metal consumers would find it unprofitable to install expensive furnaces and refining appliances for the treatment of the waste on their own premises, and these have the option of dealing with the scrap refining companies operating in every large city. Those who dispose of their scrap to the refiners need trouble themselves little with the methods used in the recovery of the valuable metals therefrom, their chief object being to secure a fair price for the material sold. With them the perplexing question is: "What is a fair price for my scrap?"

Many kinds of scrap, such as drosses, sweepings, filings, etc., cannot be fairly appraised until after it has been assayed, and the attention of all dealers in scrap is urgently directed to the necessity for careful sampling of all such material, and for check analyses of the samples by both buyer and seller. Neglect of this precaution has often resulted in losses many times greater than the cost of the analysis.

Brass and other alloy scrap is recovered chiefly by remelting in crucibles with new metal. Pieces too large for crucibles are chopped by machinery, and the chopped material is compressed into little bales by the hydraulic cabbaging press. The intelligent recovery of alloy scrap requires that the different compositions be kept in separate bins, properly labeled, thus obviating the necessity for sampling and analysis when the time comes to use the metal. Fine particles of brass, such as occur in ashes, skimmings and sweepings, are recovered by a system of washing and jigging.* Concentration tables, such as the Wilfley or Deister—basing an opinion on the success attained by such mechanical oscillating tables in the concentration of copper ore—would seem to be admirably adapted for the recovery of brass fines. The concentrates obtained from jigging processes are passed through a magnetic machine to remove metallic iron, and are then smelted in a reverberatory furnace, or they are melted down in crucibles or oil burning furnaces and cast into ingots.

SCRAP RECOVERING FURNACE.

The treatment of copper scrap varies according to the character of the material operated upon. The copper may exist in the metallic state, as in trimmings from copper sheet, boring, grindings, punchings, etc.; or it may exist in chemical combination with some other element—as in copper scale or blue vitriol.

The metallic copper scrap may be melted down, with or without copper scale, in reverberatory furnaces, similar in all respects to those used in the Lake Superior copper mining district. The molten copper is then "rabbled" or agitated in the furnace to oxidize impurities and cause them to rise to the surface in the form of slag, which is skimmed off. In the Lake district the rabbling is done by means of compressed air, but many scrap refiners still cling to the old process of rabbling with hand rakes. During the rabbling much of the copper necessarily is converted into cuprous oxide, which has the property of melting with copper to a homogeneous mass. Since an excess of cuprous oxide would diminish the softness and tenacity of the finished metal, after the oxidized impurities are slagged off it is necessary to again reduce the cuprous oxide into metal. This is done by the operation called "poling." A pole of green wood is thrust, butt end foremost, into the molten

*Cf. this journal, March, 1906, p. 55.

copper down to the bed of the furnace. The immersed portion of the wood undergoes dry distillation, and carbon monoxide, hydro-carbons, hydrogen and steam are evolved. The gases react with the cuprous oxide dissolved in the metal, reducing it to the metallic state. Toward the end of the process samples of the metal are taken with an iron ladle. The sample is chilled in water, fastened in a vise and broken. The completion of the process is indicated by the fibrous structure appearing on the fractured surface, together with a delicate salmon-pink color, and the copper becomes so dense and tough that the sample is broken with difficulty in the vise. If the fracture shows that impurities still remain in the metal, after the poling operation is completed, the rabbling, skimming and subsequent poling may have to be repeated. At the completion of the process the poling is stopped, and the copper is dipped and poured into moulds.

The slag skimmed from the process just described consists of the impurities originally contained in the charge, and combinations of copper with oxygen and the fire brick lining of the furnace. The slag may contain from 30 to 70 per cent. copper, and this is recovered by smelting in a cupola, or small, round, water-jacketed blast furnace.

A standard design for round copper furnaces is shown in the accompanying illustration. This furnace is made in three sizes, viz., 36-inch, 42-inch and 48-inch (diameters inside the water jackets at the tuyere line). Specifications for this type of furnace are as follows:

"The bottom of the furnace consists of a heavy cast-iron plate resting upon four short columns and having hinged drop doors under the bottom of the furnace shaft. The water jacket is of steel plate with riveted joints. The outside sheet of the jacket is extended down to the bottom plate to form the curb of the furnace. A sheet steel wind box encircles the outside of the jacket, suitable tuyere openings being provided from the wind box into the interior of the furnace. Above the jacket is the sheet steel hood of conical shape, provided at the feed floor level with an opening for charging the furnace. The hood terminates in a steel stack passing up through the roof of the building."

In charging the cupola, suitable proportions of limestone, or better, limestone and oxide of iron, are added to flux the silica in the refinery slag. In the east, where oyster shells are cheap, these are often substituted for the limestone. Oxide of iron is in some localities hard to get. Iron ore is the most useful material, but iron slags low in silica have been used as flux in copper furnaces. Another useful flux (when it does not carry too much sulphur) is the cinder from pyrites used in the manufacture of sulphuric acid. Coke is the usual fuel, but a mixture of coke and anthracite coal results in smaller copper losses in the cupola slag, without retarding the operation of the furnace. The products of the cupola are pig copper (containing 90 to 95 per cent. copper) and cupola slag. The former is sent to the refining furnace to be melted down and purified along with the metallic scrap. The cupola slag is a waste product and is thrown on the dump. For this reason it is necessary to keep the copper losses in the cupola slag as low as possible. Most of the plants treating scrap on a large scale for the recovery of copper have their own laboratory and chemist. It is the duty of the latter to examine daily the cupola slag, and to regulate the cupola charges so that the copper losses will never exceed a certain limit.

The fact that copper can be recovered from sulphuric acid solutions (blue vitriol) by treating with scrap iron is well known. The copper is precipitated as a red mud, the chief constituent of which, besides copper and water, is iron scale. After drying, the precipitate is a useful addition to the cupola charge, as the iron it contains is available as flux for the silica in the refinery slag.

Certain processes of manufacture yield some exceedingly dirty scrap, mixed perhaps with grease and dirty refuse to a degree which renders it seemingly fit only to be dumped into the sewer. If the metal is present in paying quantities, however, it can be recovered, no matter how much polluted, by a judicious system of drying, sorting and smelting.

RECOVERING ALUMINUM FROM SKIMMINGS.

We recently had an inquiry for a method of recovering the aluminum from the skimmings taken from the casting ladle. The company making the inquiry are in the aluminum casting business, the parts being mostly for automobile work. One essential was that the recovered metal must be of such degree of purity that it could be used over again for casting. Since the quantity of skimmings is large the waste at present going on is considerable.

There is no way of accomplishing this, in a commercial manner, except by putting the skimmings into the reduction pots, and even that is objectionable with a great many kinds of alloy skimmings, particularly those containing zinc. It is extremely difficult to get finely divided particles of aluminum to agglomerate, even when fused, owing to the difficulty of breaking the skin which covers each particle. The only method by which it was ever done is that recited by De Ville, namely, melting finely divided metal by using a double chloride of sodium and aluminum, which acts as a flux and permits some of the finely divided aluminum to be made into a button. This operation is, however, so difficult and so unusual that the expense of it is considerably more than the value of the metal recovered.

A MODEL ALUMINUM TOWN.

H. L. Kreusler, a Pittsburg builder, has been awarded the contract by the Aluminum Company of America for the erection of 200 dwellings at Massena Springs, N. Y. These will represent the nucleus for a new town that the aluminum company proposes building at this place. It lies on the Racquet River, adjacent to the St. Lawrence.

The Aluminum Company of America has extensive plans for Massena, intending to make it a model factory town. Squares and avenues are to be laid out, and it is to have the latest municipal improvements.

The dwellings are of the cottage type, of artistic design, and are built in groups. Some are of brick and plaster, some of brick and shingles, and some of frame and plaster; the foundations are to be constructed of concrete.

The plans and layout of the town were designed by MacClure & Spahr, architects, of Pittsburg, and it is said Kreusler is the first local contractor to undertake the construction of a town. The contract calls for the buildings to be completed by early fall, and work will be started at once. The cost of the first allotment of dwellings is about $400,000.

It is a good idea to place a plating dynamo inside of a special room provided with glass windows, so that the running of the machine can be easily watched, while at the same time it is removed from the action of the noxious vapors and the dust of the plating room.

THE PATTERN SHOP AND ITS RELATION TO THE FOUNDRY.

By William H. Parry.

It is customary among pattern makers to deride the mechanical ability of all molders; in fact, it is a favorite expression when referring to a certain molder to say: "He is not a mechanic, but a molder." Now, this is all very pretty and doubtless amuses our pattern making friends hugely, but when I say that after an experience as a pattern maker covering over 32 years, my respect for the molder has increased to such an extent as to classify him as a better mechanic—man for man—than the generality of pattern makers.

When we consider the vastly different conditions that these brother craftsmen work under, it is small wonder that all of the conceit is monopolized by the pattern maker, though it may be said truthfully that all of the ignorance ascribed to either is not entirely absorbed by the molder. While pattern makers have opportunities far superior to molders to make themselves efficient mechanics, their insufferable conceit and envy of one another, and general all-around cussedness, precludes that possibility.

The molder, on the other hand, is apt to be a happy-go-lucky chap who learned his trade from necessity not from choice, and, having accepted the inevitable, proceeds to do his best to make good castings from every bad pattern, and by very bad patterns I mean patterns that show a smooth surface, a high polish, lots of back draft, with pieces fastened on the cope side that ought to be loose, no rapping plates, no lift irons, and no other feature to commend them, except, possibly, the pattern maker's statement that they are too damned good to be placed in the hands of a "sand rat."

That the antagonism between these brother trades will always exist is true, to my mind. Just as long as young pattern makers, who half serve their time, call themselves full-fledged artisans without having had at least one year's experience in a foundry (two would be better), as pattern makers are not made in a pattern shop, strange to say, any more than they are made in trade or technical schools, where a smattering of pattern making and molding is taught—just sufficient to give these conceited young jackasses an inflated idea of their own importance, and make them the means of creating trouble for those who are unfortunate enough to be subject to their orders, and whose knowledge is vastly superior to that contained in the thick cranium of these young "dopes."

So, as a pattern maker who has met and worked side by side with both molders and pattern makers for many years, I would appeal to the white-shirted, striped-aproned "miscanic" to remember that while he of the blue shirt and 95-cent trousers may look outwardly dirty, from the nature of his calling, his brain is apt to be and is cleansed from all mechanical dross such as invariably overloads what little gray matter adheres to the interior cells and side walls of most pattern makers' heads.

Perhaps a few instances that have happened to me will illustrate better than any other means at my command just what can be done to bring about a better feeling between the two crafts. Many times it has come to my notice that 999 pattern makers out of every 1,000 don't know how to make core boxes that can be rammed by the core maker. I refer, of course, to complicated work, where knowledge of core room requirements is absolutely essential to the making of a thorough pattern maker; and I've seen cases where the only means to get sand inside the box would be through the medium of a squirt gun, or a sand blast, to say nothing of the placing of wires and vents which I suppose were intended to grow while using the sand injector from seeds contained therein. With such core boxes to work with is there any blame to be attached to the core maker if the core box has to be cut in sections to make the core. I say, "No; a thousand times, no," though it were better to have the pattern maker do the cutting just to show him how very little he knows about core making.

Just here I want to tip the reader off on a little game worked recently by a jobbing foundryman who reached the other extreme by not using the core boxes as made and must needs make his own iron core box, using the wooden one as a master pattern, and forgetting that the contraction was just enough to destroy the correct relation of one core to another and lost in the neighborhood of $500 by his little indiscretion through the return of the castings. If the boxes are not right to your way of thinking have the owner alter same if he will; if not make the best of it—that is, if you want to hold the work.

Let me recite another instance that occurred within the past few months, where gas engine cylinders were wanted for a 2-cylinder engine that castings had to be right and left hand. A complicated set of core boxes for each cylinder were shipped to the foundry, and the castings that resulted were of the hermaphroditic order, neither fish, flesh nor fowl, all due to haste, as the foundry could produce but one casting per day. It would have been better for all concerned if the one hand cylinder had been cast first, to be followed by the other after returning the first set of boxes, though, of course, no blame can be attached to the pattern maker here except in the way as stated.

Three years ago it was my unpleasant duty to act as judge on the "moldability" of some patterns that the boss molder claimed could not be molded as made. The boss pattern maker in this case, who was not of the high and mighty class, readily acquiesced when I decided against him and advised the very liberal use of a fine saw so as to get things out of the sand, and incidentally acknowledged that he was not a practical pattern maker but had become boss of a shop through "influence," and laughingly said that he proposed to hang on to his job as long as the company that employed him could stand it.

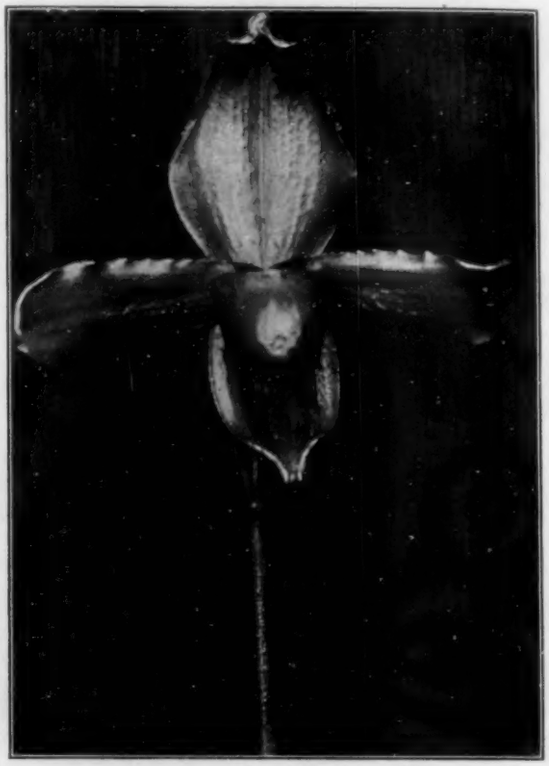
Recently I visited a foundry where a pattern of a punch press frame was being molded, and as the casting weighed 14 tons, the pattern was of goodly proportions, so much so in fact that the pattern maker must have decided that draft was not necessary, as it would require the use of a crane to lift it out any way. I must say that it was a sight to see this immense botch being pulled out of the sand by fits and starts, with a molder on each corner tugging at the slings and making "pink tea" remarks, as one after the other chunks of sand were displaced through the pattern maker's density as to the need of draft and lots of it when the work is large and the draw is deep. This pattern was made at a jobbing shop and was the worst piece of pattern making I've run against in years, and it just shows that men who run jobbing pattern shops are those who know least of foundry requirements, hence their work is always poor though it may be varnished to look "real cute."

CASTING OF FLOWERS, LEAVES, ETC.

By Carlton H. Winslow.

I have experimented with the casting of flowers, leaves, etc., taken from nature and have had some very fine results especially with blackberry leaves and thorns, orchids, oak leaves, acorns and numerous other things. All of the above can be made very useful and practical in the silver business for applying or mounting of special work, by taking leaves and coating them evenly on

BLACKBERRY LEAVES.

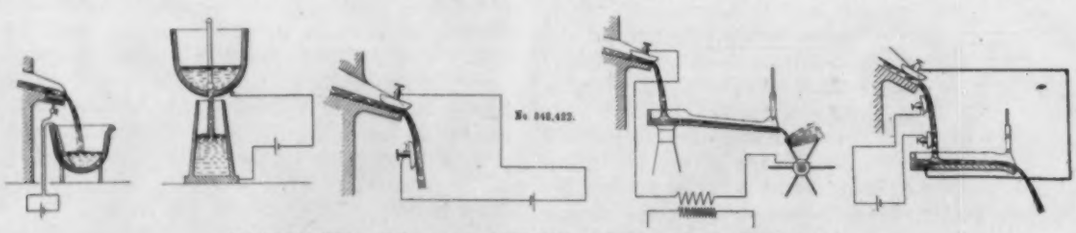


CAST ORCHID.

the back with hot wax, applied with a soft brush, to get the thickness desired. The designer of such work can arrange them in the form of a border or mount them to the shape of a shell or form upon which they are to be applied, leaving them as under cut and bold as they will lie, after which a lost mould is made over them, such as is used by workers in this line. After burning the leaves from the mould a perfect casting of them can be had in britannia, sterling or bronze. This gives a casting that is true to nature in every respect and the matting and veining of the leaf is as fine as the original.

MAINTAINING THE HEAT OF MOLTEN METAL BY MEANS OF ELECTRICITY.

A patent issued to Frank Wynne, of Westminster, London, England, March 26, 1907, describes a method of maintaining or superheating molten metal while flowing from the furnace or melting pot to the mold, rolling table or runner. The metal thus assumes a more liquid condition than it would otherwise. This greater heating is affected by causing an electric current of sufficient strength to flow continuously through the stream or a part of it while it is falling freely through the air. The electric current is caused to flow longitudinally through the stream, the receptacles from and into which the molten metal flows being insulated from each other. But the electrodes may be arranged in various ways as indicated in the drawings. The object is to heat the molten metal to a higher degree, but not to such a degree as to vaporize the metal. When heating the stream of molten metal while it is flowing, the electric current is used to better advantage than when the metal is heated in the melting vessel.



MAINTAINING HEAT OF MOLTEN METAL BY ELECTRICITY.

COPPER IN TURKESTAN.

According to advices from St. Petersburg to the London Times, a syndicate has been formed there for the exploitation of the rich copper mines in Russian Turkestan. The syndicate has acquired rights over 15,000 acres of territory. The district is said to comprise the finest copper-producing area in the whole Russian Empire. The company will shortly be formed with an initial share capital of $750,000.

LAKE COPPER VERSUS ELECTROLYTIC.

By Andrew M. Fairlie.*

(Continued from March issue.)

IV.—Production of Blister Copper.

Blister copper is an intermediate product between copper matte and electrolytic copper and is usually about 99 per cent. pure. Copper matter is regarded as a mixture of copper subsulphide (Cu_2S) and iron monosulphide (FeS) in varying proportions and is an intermediate product between sulphide ore and blister copper. The percentage of copper it contains may vary widely, ranging usually between 7 per cent. and 60 per cent., although both these limits are at times exceeded. Copper matte is brittle and its specific gravity is in the neighborhood of 4 and 5. The low grades are dull black in color, but mattes carrying 30 to 50 per cent. copper show a purplish tinge, which deepens as the grade of the matte advances until with 60 to 65 per cent. copper the color is so pronounced that matte of this grade has become known at the smelters as "blue metal." "White metal" is matte from which all iron has been eliminated. It carries nearly 80 per cent. copper and its fracture is of a steel-white color.

Slag has been referred to already in the March issue of The Metal Industry under "Production of Lake Copper." It is a waste product of variable composition, consisting chiefly of silica combined with lime, magnesia and oxide of iron. It is produced in the blast furnace, the reverberatory and the converter. It is usually black, is harder than matte, its specific gravity is less and it is vitreous and very brittle.

Some conception of the nature of these metallurgical products is necessary for the comprehension of the processes of winning copper from ores. The means adopted to attain the one end differ widely. The character of the ore, the conditions peculiar to the mining locality—such as distance from a railroad, availability of flux, fuel and water, quantity and quality of labor—are prime factors in determining the details of the process adopted.

Carbonate and oxide ores, usually found near the earth's surface, have been formed by the action of the atmosphere and water on more or less exposed sulphides. The sulphide itself is found at greater depths and in quantities far surpassing the upper layers. The carbonates and oxides may be smelted in reverberatories in much the same manner as the "mineral" of Lake Superior. The sulphides, from which the bulk of the world's copper supply is derived, shall be our chief consideration.

If the ore is very silicious—that is, if it contains much gangue rock—and if, besides, it is low grade, it is concentrated before smelting. The process of concentrating the copper rock of the Lake district has been described, and in general the same methods are employed in the concentration of copper ore. Jaw crushers and rolls are used for crushing the ore in preference to steam stamps, and the crushed material is jigged with the aid of water, the heavy ore being retained and the lighter gangue washed away. The fines are passed over oscillating concentration tables for the recovery of the fine particles of ore. The concentrates are drawn off into settling tanks, then drained in bins and finally transported to the smelter.

In former years ore roasting was considered a necessary preliminary to the smelting of sulphide ores. The various processes of roasting may be classified under two heads: heap roasting and roasting in enclosures—shaft furnace, kiln or calciner. In both classes the object is to remove sulphur and to partially oxidize the ore to facilitate smelting. Successful heap roasting requires a considerable degree of skill and care. The ore is built up in heaps, together with wood for fuel, and air passages are provided for draught.

Since the inauguration of "pyrite smelting"—of which more will be said later—the practice of roasting ore has gradually fallen off. It is still used, however, in the treatment of finely divided ore, and for roasting fines a furnace of some sort is necessary. The reason for roasting fines is that they cannot be smelted in a blast furnace (unless the expensive process of briqueting be adopted), as they are blown out by the blast almost as fast as fed in. They are therefore treated in a reverberatory, and the best results are obtained when the ore carries 7 to 8 per cent. sulphur. Any excess over this percentage is driven off by calcining. Since much of the ore of the far West passes through concentrating mills, which produce large quantities of fine concentrates, roasting in furnaces is still an item of importance in this country. At the Washoe plant at Anaconda, Mont., there are seven reverberatories having, combined, a daily capacity of 2,100 tons. The charge of hot calcines, mixed with limestone and flue dust, is dropped in through the roof of the furnace. The slag is skimmed off every four hours, but the matte is allowed to accumulate up to 200 tons, when it is tapped off as needed and sent to the converters.

BLAST FURNACE.

The blast furnace is used for smelting high grade ore from the mines and coarse concentrates from the mills and for concentrating low grade matte. A common type of blast furnace is rectangular in cross section and is 56 inches wide by 180 inches long at the tuyeres. The furnace consists of a sump, or "crucible" as it is called, at the bottom for the reception of the molten matte and slag, surmounted on the sides and ends by a lower and upper row of steel water jackets. Above the upper tier of jackets come the mantel plate and apron, inclined so as to form a hopper for the admission of the charge. The total height from tuyere to feed floor is 18 feet. The furnace is girded about, 8 feet below the feed floor, by the bristle pipe, which is fed with blast at 30 to 40 inches pressure and delivers it to the tuyeres. The number and size of these may vary according to the ideas of the designer, but a furnace of the size mentioned might properly have thirty-four 3-inch tuyeres. The top of the furnace is connected by a pipe of large diameter with the flue-dust chamber, through which the furnace gases are led for the purpose of settling and recovering the fine particles of the charge driven out by the blast. The gases finally pass into a chimney (at the large plants 300 feet or more in height and thence to the open air. At the bottom of the furnace, and usually at the middle point of one side (which is called the front of the furnace), there is a spout which delivers molten matte and slag into a forehearth or settler. This may be circular in form and a diameter of 16 feet and height of 5 feet are dimensions frequently employed in its construction. But other forms and dimensions have been employed, as at the Copper Queen smelter, Douglas, Ariz., where the settlers, oval in shape, are 10 feet wide by 23 feet long. Settlers are lined with

*Chemist, Tennessee Copper Company, Copper Hill, Polk County, Tenn.

refractory brick and have two spouts—one at the top for the continuous delivery of slag and the other, the matte spout, tapped at irregular intervals, at the bottom.

The tendency to-day is towards blast furnaces of larger size than the one described. The Copper Queen has five furnaces 18 feet long and five 20 feet long. The management of the Washoe smelter at Anaconda has recently constructed blast furnaces of stupendous dimensions. The equipment was formerly seven furnaces, 4 feet 8 inches wide by 15 feet long, arranged end to end, and 21 feet apart. A huge furnace was made by joining two adjacent furnaces and including the space between them. In a similar manner the third and fourth furnaces were merged into one and likewise the fifth and sixth. Finally one of the enlarged furnaces was combined with the remaining small one, including the intervening space as before, the result to-day being an equipment of two furnances, each 4 feet 8 inches wide by 51 feet long and one furnace of the same width but 87 feet in length.[1]

The methods of charging and operating the blast furnace are as numerous as the smelters of copper sulphides, for the local conditions at each plant determine the mode of procedure. At Anaconda the charge is delivered along the sides of the furnace in trains of eighteen cars, each car holding 2½ tons. The cars are loaded by gravity from overhead bins with the following material in the calculated proportion and in the order named: Coarse concentrates from the mills, briquettes (made by compressing various finely divided products, as fine ore, slimes from the concentrators, etc., into brick form), high grade ore, slag rich in copper, and limestone. The charge is dumped in through the side doors and coke is charged separately. The matte produced carries about 40 per cent. copper, which is tapped off intermittently from the settler into a 10-ton ladle run in on a track ten feet below. The matte is then transferred to a converter for the production of blister copper.[2]

At the Copper Queen smelter the ores are bedded with the limestone flux in pits, four in number, each 800 feet long by 41 feet wide by 11 feet deep. The cars from the mines discharge ore from tracks alongside the pits, and after each delivery of ore a mechanical spreader, or plough, traveling on the same tracks, is run through it, leveling the dumped ore and making the bed ready for the next train from the mines. The use of the spreader secures a more intimate mixture of the ores and flux. The charge is loaded from the pits into cars by means of steam shovels which run on tracks on the floor of the pits, eleven feet below the tracks used by the mine train and spreader. The trains of loaded charge cars are run under the coke bins, where a weighed amount of coke is added to each charge and the trains then proceed to the charge floor of the furnaces.[3]

At the Cananea works, in Mexico, a different bedding system is employed. The railway cars dump the ore into hopper bottom bins, whence it is discharged to a system of belt conveyors, which carry the ore through a sampling mill, where the coarse lumps are crushed. The crushed ore is then piled on long ore beds. These in shape resemble the gable roof of a house. A tripper passes back and forth over the ridge, dropping ore always on the crest. A second system of belts conveys the smelting mixture from the ore beds to the feeding devices at the furnaces.[4]

[1] In chapter II of this series reference was made to the three 51 ft. furnaces of the Washoe plant. Advice regarding the completion of the 87 ft. furnace has been received since chapter II was written.

[2] Trans. American Institute Mining Engineers, July, 1906, p. 529, ff.

[3] *Engineering and Mining Journal*, August 11, 1906, p. 242, ff.

[4] *Engineering and Mining Journal*, October 6, 1906, p. 623, ff.

Other plants present other peculiarities. If the ore is rich in sulphur it can be smelted direct and no concentration mill is needed. In such cases pyrite smelting, or quasi-pyrite smelting, is adopted and a low grade matte, carrying 10 to 20 per cent. copper, is produced at the first smelting. This is concentrated, after it is cold and broken up, by recharging into the blast furnace, together with coke and quartz. The latter unites with the excess iron in the low grade matte to form slag, producing a matte of 40 to 50 per cent copper.

Pyrite smelting consists in the smelting of sulphide ores in such a way that the heat required for smelting is derived from the combustion or oxidation of the sulphur and iron in the ore, without the aid of carbonaceous fuel. As a matter of fact, it is doubtful if pyrite smelting in accordance with this definition is to-day practised anywhere in the United States. At the same time it is true that so-called pyrite smelting has largely superseded the old practice, viz., roasting the ore in mechanical roasting furnaces, pressing the fine calcines into briquettes and smelting these and the roasted lump ore with coke. This quasi-pyrite smelting consists in smelting the ore raw, utilizing the burning sulphur as the main fuel, and supplementing it by the addition of such coke as may be required, the amount varying according to the nature of the ores smelted from 2 to 10 per cent of the weight of the charge. It has been stated, however, that at Keswick, Cal., the Mountain Copper Company has demonstrated that the use of coke can be entirely eliminated in the smelting of raw sulphides.[5] The same type of blast furnace may be used for pyrite smelting as for smelting roasted ore and the object of each process is the same—namely, the production of convertible matte.

CONVERTERS.

Copper converters are built of steel in various sizes up to a capacity of eighteen tons. The converter commonly encountered is cylindrical in shape, with a diameter of 8 feet and length of 12½ feet. It is provided with a row of tuyeres near the bottom for the entrance of blast at a pressure of from eight to fifteen pounds, and is mounted on trunnions, whereon the converter is rotated on its longitudinal axis by hydraulic or electric power for the admission of a charge, for skimming, or for pouring out blister copper. When upright in its stand the mouth of the converter is directly beneath a hood, leading into a flue connecting with the dust chamber.

The process of producing blister copper from matte depends for its success on the converter lining of quartz and clay. Preliminary to charging for the first time a converter, as well as its cover, is lined with an intimate mixture of crushed quartz and clay, rammed firmly into place with a tamping machine driven by compressed air. Gold-bearing quartz is highly prized for converter linings, as the precious metal can be extracted at no additional expense. Highly silicious copper ore, with or without gold and silver values, is likewise preferred to barren quartz. During the lining process a wooden mould is put in the converter and later withdrawn to produce the cavity for the reception of the matte. The lining complete, the cover is replaced on the converter and the two are bolted together. The lined converters are dried and heated preparatory to use, firing first with wood and finally with coal. Recently the drying has been hastened at some plants by pouring in molten slag.

When dried, the converter is conveyed to its stall by an electric crane and set in place. A charge of molten matte, weighing several tons, is tapped from the settler and

[5] T. A. Ricard: Pyrite Smelting, p. 227.

poured into the converter through the mouth on the top of the cover. The converter is turned until its mouth fits under the hood, the blast is turned on and conversion begins. The iron in the matte is oxidized by the blast and unites with the silicious lining in the converter to form slag. At the same time some of the sulphur is oxidized and escapes as a gas (SO_2). Other impurities, such as zinc and arsenic, are also volatilized. When the charge is partially blown the mouth of the converter is turned down and slag is skimmed off. The converter is righted again and blowing is resumed until the iron is all oxidized —the "white metal" stage. Slag is again skimmed. The iron being now practically all removed, the only impurity remaining in large quantity is sulphur, and the converter is righted for the final blow to remove the sulphur from the white metal. The end of this operation must be watched with care. When the sulphur is practically all eliminated as SO_2 gas, and before the copper has a chance to "burn," the converter is turned down and the copper is poured into moulds carried by a hand car which travels on a track beneath the converters. The molten metal always contains a small amount of SO_2 gas, which continues to bubble out for several minutes after pouring into the moulds. As the metal solidifies this bubbling produces blisters on the surface of the bar, whence the name "blister copper."

The converter, after emptying, may be recharged with matte for another blow and this process may be repeated five or six times before the silicious lining becomes too thin for further use. As each successive charge of matte removes more of the lining the capacity of the converter gradually increases and correspondingly the size of the charge can be increased each time until finally it attains twelve tons. When a converter lining is exhausted the converter is removed to the lining department and relined.

The blister copper is chilled by a spray of water, and when it has solidified is dumped from the moulds, loaded upon trucks, weighed, and shipped to the electrolytic refinery.

(To be continued.)

THE USE OF AMMONIA IN THE SOAP COMPOUND CLEANING SOLUTION.

By Chas. H. Proctor.

Some time ago the following question was asked in an open letter in a certain metal publication, presumably by a subscriber, and up to the present writing the writer has not seen it answered. The question was as follows: "I have some platers' compound or fish soap, which smells of ammonia. The fish soap which I have heretofore used did not contain it. I fail to see its advantage. Can any reader enlighten me on the subject?"

The writer thought that a few remarks on this subject would probably prove interesting to the readers of The Metal Industry. As is well known, platers' compounds or fish soap, or whale oil soap, as they are commonly termed, are used extensively in removing adhering polishing compounds from finished non-ferrous metal articles by boiling them in the soap solution. In many cases this could not be accomplished in any of the potash solutions, especially when soft solder has been used on the articles, owing to the action of the caustic alkali upon the tin contained in the solder.

It has been found by experience that a nearly neutral solution of a soapy nature gives the best results. There are several brands of platers' soap upon the market, which contain a small amount of free ammonia. The addition of the latter probably fills a two-fold purpose. In the first place it disguises the odor of the soap itself. In the second place ammonia is a powerful alkaline solution and when it is added in the correct proportion, it exerts a softening influence upon the polishing materials which have been used in the finishing of the metal goods. It, therefore, renders them more easily removable in the soapy cleaning solution.

A platers' compound which is manufactured by a well-known New York concern and which has been on the market for many years contains no free alkali in the form of ammonia. It has been claimed for it that it was the best material of its kind for the purpose of cleaning polished metals.

The writer has had a number of years of experience in the handling of platers' compounds. He has come to the conclusion that a small amount of free alkali is an advantage, especially in the form of ammonia, when it is used in connection with a very small amount of potassium cyanide. This not only makes the polishing materials more soluble but it also prevents the formation of oxides which frequently occur upon the polished surface of the metal, when the soap has been used only for a day or so or for a longer period.

In the writer's experiments he has found that the addition of one oz. of C. P. cyanide of potassium and of 3 or 4 oz. of 20 to 26 per cent. ammonia water, when occasionally made proportionately to a solution of 40 gallons gives very good results in preventing oxidation and rendering the work brighter than when first immersed.

A CLEANER FOR SMALL WORK.

By George O. Thompson.

In all branches of plating successful work depends a great deal on cleanliness. One of the many troubles that a plater of small work has to contend with is how to clean such work quickly and have it plate satisfactorily. For instance, take german silver and brass articles that have any soft solder about them. If cleaned in the ordinary manner the solder blackens, and unless this black is removed, either by scouring or scratch-brushing, the plate will not adhere. The writer has had this experience when silver plating brass and german silver watch cases that had hinges soft soldered onto them. After a good deal of experimenting I adopted the following method for cleaning the work, and can recommend it as a quick and efficient cleaner. Take half of a barrel, fill it two-thirds full of water, into which dissolve 4 lbs. of potash and 1½ lbs. of cyanide; next add about 4 pailfuls of coarse sawdust. String up the work, as usual, on wires or racks. If very greasy dip a few times in benzine, then transfer the articles to the cleaner, stir the sawdust up well, keeping the work moving well at the same time. After the articles appear to be sufficiently scoured rinse off in clean water and proceed to plate.

STORAGE BATTERIES FOR ELECTRO PLATING.

By using storage batteries the plating operations may be carried on continuously when the regular motive power is at a standstill, such as noon hours and evenings, when the outlay for power would be too expensive for the sole use of one room or department. Each storage cell develops two volts and by connecting in series the number of volts can be increased as desired. Six volts is the usual standard for plating room use. The size of the cell, of course, determines the amperage. The larger the cell within a certain radius the better. The voltage is exactly the same on large or small cells.

METHOD OF SILVER FINISHING IN BIRMINGHAM, ENG.

By F. J. Frost.

The article coming from the silversmith's is first sandbobbed with felt or leather wheels, using with them Trent sand moistened with oil. Common machine oil is customarily used, the sand being saturated and not mixed as a paste. These felt and leather wheels are of various sizes, dependent on the shape of the article.

For getting under handles or spouts and similar obstacles nick bobs are used, made of ordinary sole leather, 3 to 4 inches in diameter and about ¼ inch in thickness, the edge being tapered to a point. This bob is slightly flexible and is applied sideways to the article.

For flat surfaces a hard felt bob is used 3 to 4 inches in diameter and 2 to 3 inches wide.

For the inside a bob is made of soft felt, 1 or 1½ inches in thickness, and pierced sufficiently to hold it to the lathe spindle without penetrating the bob. The inside diameter is smaller than the outside and the cutting surface must be perfectly smooth and flat.

Larger bobs are made by covering wooden discs with sole leather, which is done by using wooden pegs to hold the leather to the stock in addition to glue. When using glue for this purpose a small amount of rosin added to the glue previous to using renders it more adhesive. The glue must be very hot, having been heated in a vessel surrounded by boiling water for at least an hour. Also have both surface of wood and leather, to which the glue is to be applied, perfectly clean. Bobs made of walrus hide, bull neck and felt are used for special purposes.

A sand bobber often has to make from these materials a small bob in order to properly reach the crevices of the article which cannot be reached with the bobs he has in stock.

With a sharp knife he cuts out of the raw material, as near as possible, the amount he requires. This is pierced in the centre with a gimlet or nail. This hole is used to fasten the partly made bob on the lathe. A stick is now cut to a length equal to the distance between the spindle of the lathe and the bench. Using the stick as a brace the bob is cut with a sharp knife into the required shape. The lathe should run 1,200 to 1,500 revolutions a minute.

This operation being completed, the article is next polished on the outside with an unbleached muslin wheel, with the aid of tripoli composition. Those parts of the article, more particularly the inside portion of the handles, not possible to reach with a bob, are polished with the aid of cotton string to which a little tripoli paste has been applied. One end of the string being tied to the bench the other is held in the left hand. The article is held in the right hand and moved vigorously up and down the string. The article is next sent to the plating shop and coated with a light film of silver to cover the fire coat and to put a scratch brush finish to the inside or, as is frequently the case, the inside is given a coat of light yellow gold. Inside parts of handles and other difficult places to reach are burnished. Being returned to the polishing shop, the article is polished with rouge and a soft wheel, which the workmen style a soft dolly. This operation imparts the lustrous finish. The rouging wheel is revolved at the rate of about 2,500.

The article is then dipped in potash and rinsed, and then washed out with hot, soapy water, to which a small amount of ammonia water has been added, using a soft sponge to wash out the dirt. Then rinse it well in clean, cold water; dip in clean, hot water and wipe with a perfectly clean cloth. This must be done as quickly as possible to prevent stains appearing.

The final operation consists of going over the article with an old rouge dolly containing no longer any rouge. It must be very soft and perfectly free of grease or dirt; in fact, this buff is kept wrapped in tissue paper when not in use and is handled with great care.

SIMPLE PRODUCTON OF THE BRUSH BRASS FINISH.

By Charles H. Proctor.

The brush brass finish still retains its hold upon the public for its artistic qualities. In addition to brass, copper and bronze are being produced in this finish and exceedingly fine effects are already to be seen. Many methods are in vogue for obtaining this finish, but I know of none that are more simple or yield better results than those reached with the soft crimped brass wire scratch brushes.

A large manufacturer of fine brass goods recently desired a formula for a brush brass finish without showing any scratchy effect. Although having worked this finish, the desire was to have something better, and the method about to be described was sent to the firm, who stated that they were able to produce the desired results with success.

In using this process, whether the metal be cast or sheet, or in plated effects, a cut-down finish with tripoli should first be produced upon the surface. The scratch brush should be about 5 inches in diameter, 4 rows thick, made from dead, soft crimped wire and run at a speed not to exceed 1,200 revolutions per minute. The articles are potashed and passed through the cyanide bath after cutting down to free from grease and oxides. The articles are then brushed in the manner of scratch brushing, applying very little powdered pumice stone moistened with water to the brush. The articles should be kept moist, the water being softened with a little sal soda. For circular articles a circular motion should be given; for straight work the motion should be up and down. After the deading effect is produced the articles are passed through cold water. Then through the regular cyanide solution, again washed and immersed in a plater's compound consisting of 2 ounces of compound to each gallon of water used cold. They are then rinsed in boiling water, dried in maple sawdust and finally lacquered with a heavy lacquer half varnish and half collodion.

The use of the soap solution aids in drying. The water will run clear from the surface of the metal after passing through the boiling rinsing water. A boiling solution may also be used consisting of 1 to 2 ounces of cream of tartar in each gallon of water. After rinsing in cold water pass the articles through the tartar solution and dry direct from this bath in sawdust as mentioned. With a little practice better results will be obtained by this method than by any other means, and in addition the work is done much quicker.

Austria receives two-thirds of her entire imports of copper, amounting to 20,000,000 kronen ($4,000,000) almost exclusively from America.

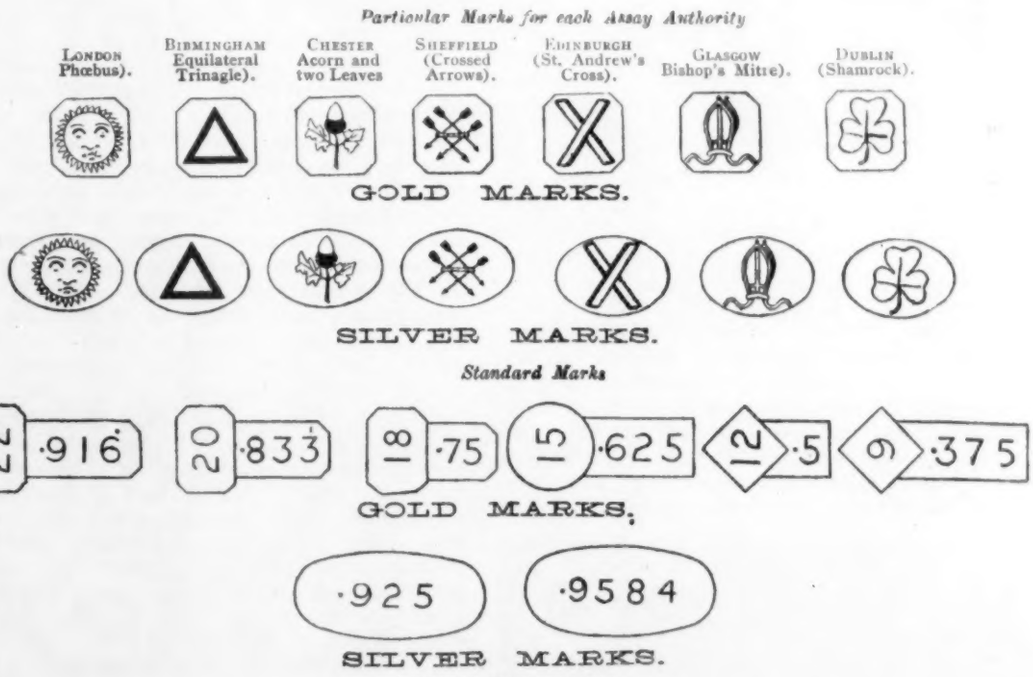
Consul General R. P. Skinner, of Marseille, sends the following item in regard to Tunis: "Then the sudden rise in the value of zinc rendered the beds of calamine more important. In the neighborhood of the phosphate beds of Gafsa the mines of Ain-Moulares, which are no less important, have been found."

BRITISH HALL-MARKING—AN ANCIENT AND ELABORATE SYSTEM.

By J. Horton.

The hall-marking of gold and silver jewelery, and plate, is one of the most venerable of British institutions. It goes back at least 600 years, while the Goldsmiths' Company itself, which has exercised a skilled supervision over the practice, dates back to the year 1300. British traders very early awoke to the fact that there are no other articles in the manufacture of which such gross frauds can be committed as jewelery goods, and, in fact, precious metal goods generally.

The series of Acts of Parliament bearing upon hall-marking would themselves fill a bulky volume, while the various marks used have associated with them most interesting histories, many having a curious and quaint origin. But the object of the present article is merely to describe the present practice as carried on at the various assay offices in Great Britain.



BRITISH HALL MARKS.

Several circumstances have lately been combined to attract public attention to the practice of hall-marking, and at the present time a new controversy has arisen connected with the stamping of watch cases, which is causing a good deal of stir in Birmingham, and in the jewelry trade generally. It is remarkable that more and more reliance is being placed upon British hall-marks by the purchasing public, and every year the number of goods taken to the Birmingham assay office, voluntarily, by makers, increases. Manufacturers say that buyers have got into the way of looking for the hall-mark, and will not buy their goods without. This practice has now grown to such an extent that by far the larger proportion of branded goods comprises articles which, not being "plate," are under no legal obligation to bear a hall-mark.

ASSAY OFFICES.

There are now seven assay offices, comprising London, Birmingham, Chester, Sheffield, Edinburgh, Glasgow and Dublin. Formerly there were twelve, but those that existed at York, Exeter, Bristol, Norwich and Newcastle-on-Tyne have been closed, mainly on account of the gradual concentration of the jewelry trade in Birmingham and London. Birmingham deals with more articles than all the other six offices put together, and in many ways it is the most typical assay office in the world.

The legal requirements and the actual procedure may be briefly summarized. The requirement to "hall-mark" applies only to silver and gold, but the law is very stringent. Every manufacturer, before turning out any goods, must register his name at the assay office, and must also register a mark consisting, generally, of the initial letters of his name, or of the style of the firm under which he trades. That mark has to be struck after registration, and the manufacturer having ascertained what mark will be acceptable, provides a steel punch containing the mark, which he submits for approval. A most essential point is that the mark shall have a distinctive appearance. Thus, if a man is John Jones, his mark would be "J. J." But if another manufacturer comes along whose name is James Johnson, he may have "J. J.," but the letters must have a variation in shape, and generally be markedly different from any already registered. The punch is handed to him after registration, and every article he makes must be branded with it before being sent to the assay office. An essential requirement is that all the parts of the article must be included, and must be in as forward a state as possible, short of absolute finishing. For practical purposes, the article is essentially finished, and the maker must not add to it, or take any important part away, after assaying.

TESTING.

The securing of sufficient metal for the purpose of testing is a delicate operation. The problem is how to obtain sufficient amount of metal for assaying without damaging the article. Many of the goods, such as rings, brooches and chains, are very small, and the only way to

deal with them is to scrape off a little metal with a steel scraper. If an article is made in several portions, a separate assay has to be made from each part. Where there are a large number of articles in one lot, a dozen or more assays may be made. Sometimes a tiny portion of waste metal can be sheared off, and in such a case the task is materially simplified. The metal is subjected to tests, and if it is found up to the standard it is marked, but if not, it is returned to the maker and destroyed. The rule as to breakage is most rigidly carried out, and, whether silver or gold, and quite regardless of the amount of labor expended upon it, it is always treated in this unsparing manner. The matter is not of any great importance in reality, in regard to the loss imposed, because even if the article were not destroyed, it would be quite unsalable, and all the owner could do would be to place it on his sideboard.

HALL-MARKS.

The hall-marks affixed consist of, in addition to the maker's mark, three other marks. If the article is of silver, the standard mark is the Lion Passant Gardant. Then there is the local mark, distinctive of each office, which, in the case of Birmingham, is an Anchor. Next there is a variable date letter, A, B, C, D, and so on, which indicates the year in which the mark was affixed, and requires the interpretative "key" to be understood. Before the abolition of the duty, which took place on the 30th of April, 1890, there was a further mark to indicate the payment of the duty, and this mark was a Queen's Head. Of course, this disappeared with the duty.

Yet another mark is that of the Britannia Silver. This was a new standard adopted in 1697 containing .959 parts of pure silver per thousand instead of the ordinary proportion .925. The mark for this was the figure of Britannia. The silver was found to be too soft for durability, and in 1720 the old proportion of .925 once more came into general use. As all metal workers know, the real usefulness of silver for practical purposes depends on its alloy, pure silver being practically an impossible metal. It must have the usual mixture to give it stability.

METHOD OF TESTING.

The method of testing is usually by what is known as "cupellation." This is carried out by the addition of a suitable quantity of lead to the alloy, which is then placed on a bone ash cupel, and held in a current of air. The current oxidizes the base metals, which form with the oxide of lead liquid slag, absorbed in the porous cupel, leaving the pure gold or silver behind, which is then carefully weighed. A more up-to-date method, which has originated in Birmingham, is what is called the "wet assay," in which the metal is treated with acids and chemicals.

A remarkable fact is that the result of the assay is never disputed, the trade apparently having absolute confidence in the office. Before an article is broken up, it has three separate tests, and in some cases, a parcel has been subjected to as many as forty tests. The report is given in ten-thousandth parts. It should be added that every allowance is made for cases in which there are indications of a clerical mistake. As a rule, large firms guard against this by testing the silver before working it up. But it does occasionally happen that an accident occurs in the blending of the alloy. The kind of accident for which a keen outlook is maintained is the mixing up of the carat. For example, in the case of gold, an article described as 18-carat might turn out to be 15-carat, and the presumption would be that a mistake in description had occurred, and the manufacturer would be allowed to alter such description. But if it should yield such an impossible composition as 17-carat, the article would be destroyed.

There is no essential difference between the regulations on the usage as regards gold and silver. The highest standard of gold is the 22-carat, which is exactly equal to the quality of the gold coinage, or .916.6, recurring decimal. This is stamped with the Crown and the figures 22. Eighteen carat is stamped with the Crown and the figures 18. Fifteen carat is stamped 15.625, and 12-carat, which consists of half gold and half alloy, is marked 12.5. The three lower standards of gold, comprising 15, 12 and 9, do not carry the Crown mark. Nine-carat gold is stamped 9.375, which represents the proportion of gold.

STANDARD QUALITY.

Generally speaking, the makers are fairly successful in keeping up to the quality, but there is not a day passes in which there are not two or three parcels of gold and silver broken up.

A somewhat curious fact which has often caused comment in Birmingham is that foreign goods appear to be more tenderly treated than home productions. They are, of course, stamped with a distinct mark, in which the Triangle is substituted for the Anchor, and the simple decimal .925 is added in lieu of the Lion. It will be seen that the quality of silver is exactly the same, and in fact, as in the case of 22-carat gold, sterling silver is of equal value to silver coinage. If the article comes to the assay office from a customer, and is found to be below the standard, it is exported to the country of origin without the hall-mark, but unbroken. If it is retained in the country, it is broken up, as in the case of a British article. The differential treatment can only be explained on the ground that a higher standard is expected of the British than of the foreign article.

As is well-known, very heavy penalties are attached to deliberate offences such as tampering with hall-marks. To imitate a hall-mark is a very grave offence, and the assay guardians instantly take action. In one or two cases, other metal has been added to finished parts that have passed through the assay office, and this is treated very seriously. The assay master is a very responsible person indeed, and is required to give a bond with two sureties to the amount of £500 for the faithful discharge of his duties, at the same time undertaking that he will not be directly concerned in the buying or selling of silver, or in the manufacture of plate. The personal record of the Birmingham assay office is remarkable. The present assay master is the fourth in the line of descent. His great-grandfather held the position for fifty-four years, and his grandfather for a similar period, while his father held the office for thirty years. This may be taken as a remarkable tribute alike to the skill and trustworthiness of a family occupying a position of distinction in the Birmingham jewelry trade.

The Birmingham office was enlarged some years ago, and is completely fitted with cooking, dining and lavatory rooms, and no one is allowed to leave the premises until all the punches are in their places, and locked with three keys, which are taken charge of by the assay master and two of the wardens.

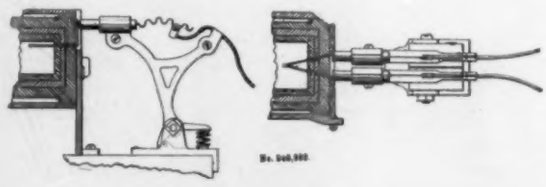
MARKING FOREIGN PLATE.

The question of marking foreign plate, and especially Swiss watch cases, is at the present time the subject of keen controversy. The real question is whether watch cases are "plate," and are therefore subject to the hall-marking requirements. For years past, Switzerland has sent watches here to receive the English hall-mark. A

series of legal actions has been tried, which have gone as far as the Court of Appeal. The last-named court has decided that as Swiss goods are "plate" they must come under the same stringent treatment as English silver-plate. But the Swiss makers do not relish this, and the Swiss Givernment is backing the interested parties in an appeal to the House of Lords. In the meantime, various negotiations are in progress. The Swiss wish to avoid the necessity of a British assay, asking that the Swiss mark shall be accepted by the British assay office as a token of genuiness, with the proviso that, as the assay test would injure the watch case, the authorities should be satisfied with an occasional test. Naturally, the Birmingham manufacturers are in arms against such a settlemen, and ask that the foreign watches shall be required to come into line with British goods, and to be subjected to individual tests. The matter is now under the consideration of the Jewelers' Association, and some strongly-worded resolutions on the subject have been sent to the Board of Trade. The strongest efforts will be made to prevent foreigners securing preferential treatment in a matter of so much importance.

PYROMETER.

Pyrometers of the thermocouple type usually consist of a thermocouple located or inserted within the furnace. This is composed of two members or wires of unlike metals united by a small ball, a galvanometer external to the furnace and electric connections between the free ends of the couple members and the galvanometer. One of the members or wires of the couple as now made is of pure platinum while the other may be an alloy of plati-



PYROMETER.

num and rhodium. When the couple is heated a very light current is generated therein, the strength of which is proportioned to the degree of heat in the furnace. The deflection of the galvanomter indicates the current and therefore the degree of heat.

The object of an invention by John F. Hammond, of Brewster, N. Y., assigned to the S. S. White Dental Manufacturing Company, of Philadelphia, Pa., is to improve the electrical connections between the couple and galvanometer and provide a separable contact between the couple and galvanomter conductors. The thermocouple is permanently attached to the muffle so that it practically becomes a part of it, with no projecting outside wires to interfere with the removal or replacement of the muffle from or to its support. The point of union between the couple and the conductors is beyond or outside the radiant heat zone so that counter electric action is avoided.

According to statements made by the officials of the department of mines of Ontario, Canada, the mineral output of the province for 1906 was $22,221,808, as compared with $17,854,296 in 1905. The most important gains were in the metals silver, nickel and copper.

MOLDS FOR CASTING HARD AND SOFT METALS.

The making of a mold for casting solder, babbitt metal, buckshot and the like calls for skill and experience; the work is a refined process at all stages of the job and to insure success accuracy must be maintained. A recent visit to the mold establishment of J. P. Fan-

BUCKSHOT MACHINE, CLOSED.

ning, 678 Jefferson avenue, Brooklyn, N. Y., was interesting as showing how such work is actually carried on.

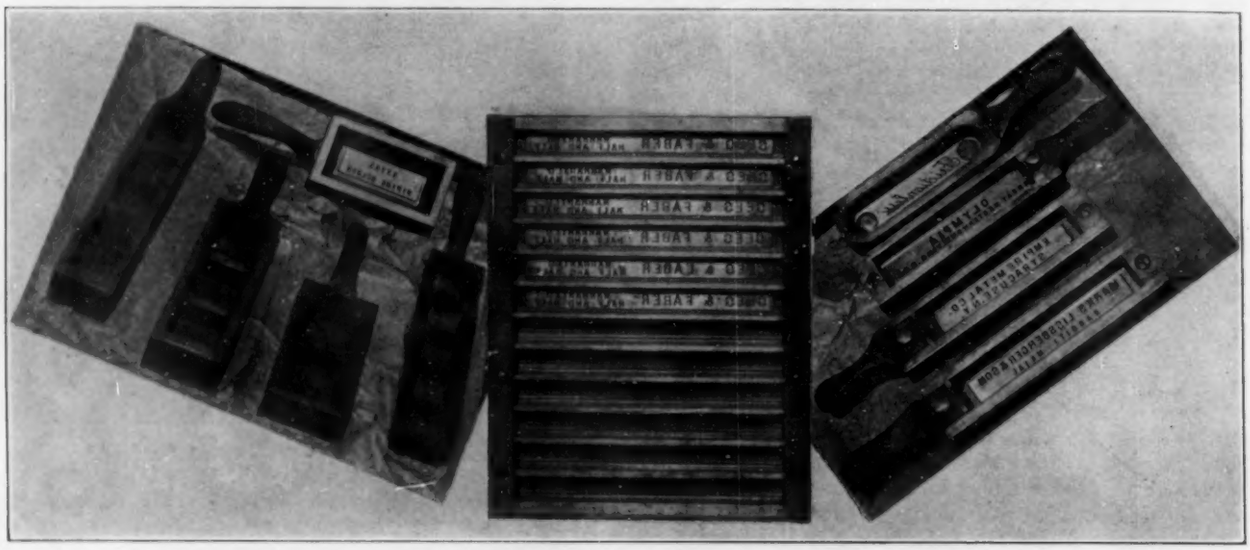
The rough iron castings received from the foundry are first planed on the top and sometimes on the bottom, according to the kind of mold required. One of the best illustrations is the mold for casting babbitt metal or solder, since both of these call for the insertion of a name plate which appears on the bar as seen in the market. While the dimensions may vary somewhat the general form is alike throughout both. The mold itself is an open box having inwardly sloping sides and a bottom piece which carries the name of the manufacturer

BUCKSHOT MACHINE, OPENED.

of the metal. It is in the name plate that the finest work appears. These plates slide into the mold from one end and that end is fitted to the body of the mold. Different name plates are made, so that the same mold body can be used for metals of different kinds or composition. If this were not done there would, of course, have to be a complete mold for each kind of metal and the cost in molds alone would be excessive. These plates are made to slide in grooves in the bottom of the mold and are interchangeable one with the other. The fit, both of the

plate in its grooves and the end piece must be perfect; an approximate fit would not answer the purpose since the casting would then show unsightly ridges along the joints. The fit must be water tight, or so perfect that the casting fails to show the location of the joint. This part of the work is done by planing and scraping.

Work of an entirely different nature, and yet one calling for the same exercise of accuracy, is the making of molds for buckshot and piano lead keys. It is enough to say that these must gauge. Since they are round the mold is made in two parts, one being the duplicate of the other. These are made in gangs so that many castings may be obtained at the same pouring. The work is done with a spherical milling tool with which the half molds are cut. The spacing must be performed perfectly, otherwise the parts will not be in true alignment. The shank of the milling cutter forms the gate through which the metal is poured. Before beginning the cutting the meeting surfaces of the mold are planed and scraped to true surfaces so that there will be no possible chance for the metal to enter and thereby form a burr on the casting. The machine for casting articles of this character is shown in the accompanying engravings. After pouring the top part or cap is moved to one side, and this movement cuts off the surplus metal, leaving the object in such condition as to require no further labor.

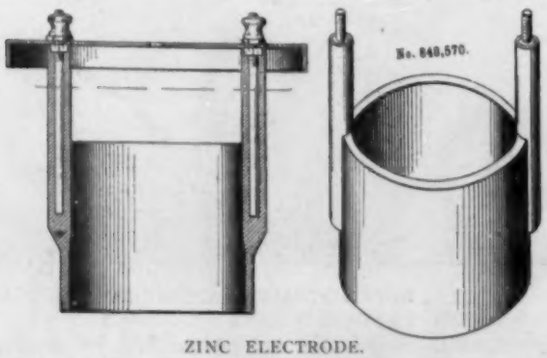


BABBITT AND SOLDER MOLDS.

The same skill is necessary in all the molds made at this establishment, whether the castings be large or small. Machines of several different pattern are also constructed for the handling of molds of different kinds, the constant aim being to expedite the operation as far as possible, and whether the castings be made singly or in quantity, to preserve the accuracy which is so essential.

ZINC ELECTRODE.

A patent granted to Charles B. Shoenmehl, of Waterbury, Conn., provides an improved form of zinc electrode for use in an electric battery. The cylindrical elec-



ZINC ELECTRODE.

trodes have hitherto been made of sheet zinc, which has been rolled into form, and the conducting wires have been riveted to the zinc. These wires have caused trouble by being exposed to the liquid, this local action resulting in corrosion, which is apt to destroy the contact between the rod and zinc. The new form of electrode is cast, and the suspending rods are protected so as to preclude any contact with the solution. Near the upper end of the rod is a hardened shoulder for the cover to rest upon, and in a way to insure a firm and durable engagement of the rod with cover. This prevents the rod and zinc from becoming loose, as the reinforced end portion of the zinc becomes soft or eaten away.

SOLDERING SALTS.

By Lincoln Burrows.

Soldering salts are made from zinc and hydrochloric acid, the chemical formula being $ZnCl_2$. Theoretically two parts of metallic zinc combine with 2¼ parts of the acid (100%) to form zinc chloride. The ordinary acid as sold 20° B. contains about 32 per cent. of acid, so it will be necessary to use 7 parts of the 20° acid to obtain acid enough to dissolve the zinc. It is usual to allow a little excess of zinc to remain in the solution until all efferescence ceases. The salts may be kept in this condition as a solution and improved by adding about quarter the weight of zinc of sal ammoniac. If, however, it is desired to make the salts themselves, the zinc solution must be evaporated to dryness and heated strongly for 10 minutes after the water has been driven off. It must now be broken up very rapidly and put in dry bottles with tight-fitting stoppers and the corks paraffined. Zinc chloride is so very deliquescent that it will become a liquid if the above directions are not carried out strictly.

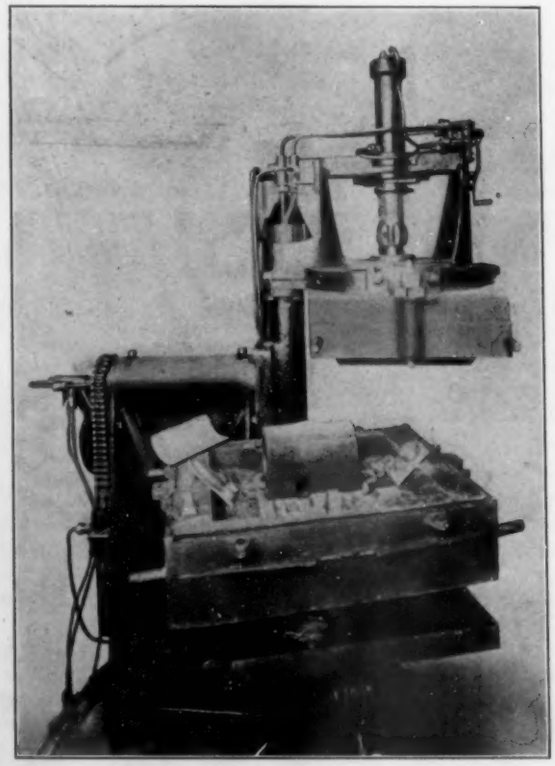
INDUSTRIAL

NEW AND USEFUL DEVICES. MACHINERY AND SUPPLIES OF INTEREST TO THE NON-FERROUS METAL INDUSTRY.

MOLDING MACHINES IN FRANCE.

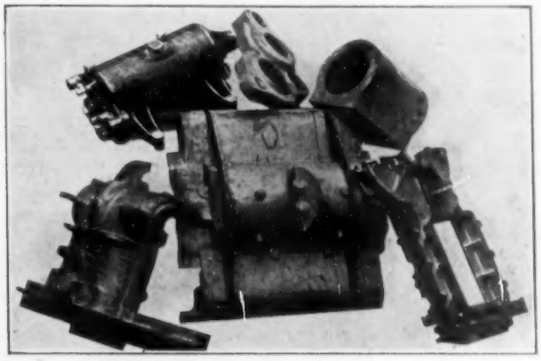
An examination of the work done in France on molding machines will convince any one that all the molding machine experts are not confined to the United States. We recently received from Ph. Bonvillain and E. Ronceray, ingenieurs, 9 and 11 Rue des Envierges, Paris, a line of photographs showing the castings made with the molding machines invented by Ph. Bonvillain. An opinion of the kind of work produced on these machines may be formed from the engravings herewith.

AUTOMOBILE CASTINGS MADE ON ONE MOLDING MACHINE.

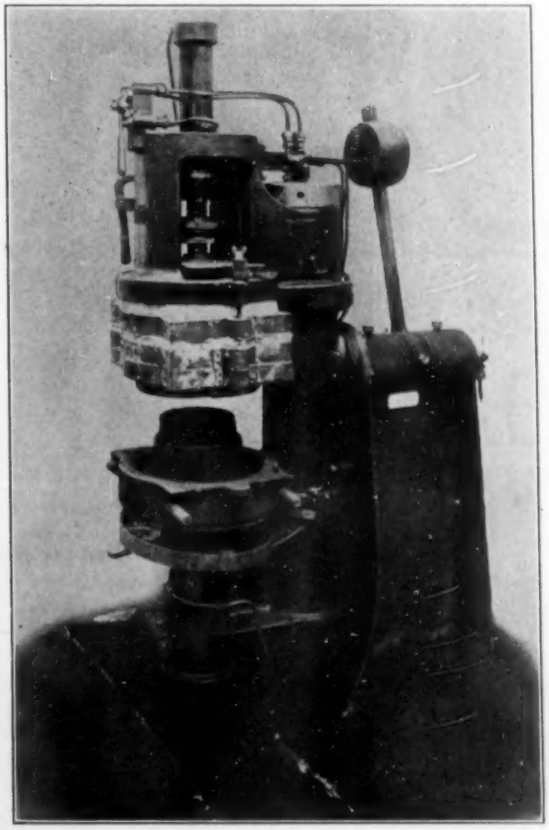


ROTATIVE MACHINE WITH CROSS-BEAM TURNED TO ONE SIDE.

These machines are patterned upon the universal system, which is in no sense inferior to that developed in connection with other machines on the market; and all work that may be done on other machines can be done as quickly or quicker on the universal. Castings which are within its capacity and of which fifty or more are required can be made to advantage. Further it is stated that the more difficult the pieces are the more the saving by the employment of the universal process.



AUTOMOBILE CASTINGS.



ROTATIVE MACHINE SHOWING MOLD DRAWN FROM PATTERN.

The power used is water under pressure, this being considered far preferable to compressed air, since the motion is smooth and steady for ramming as well as

for drawing the pattern. A steady pressure applied on the mold gives the proper hardness of the sand, and this must differ for each kind of mold and for the different parts of the mold. These machines are provided with pressure gauges to enable the operator to regulate the pressure in the cylinder according to the size of the flask, the material to be poured and the shape of the mold. If the sand breaks in drawing, the loss of time in patching is far greater than the difference between the time consumed in hand and power ramming. The universal system has been devised to save all this extra patching work. This is accomplished by giving special care to the arrangement of the machine itself. The care expended upon the machine has resulted in doing away with practically all patching and has also affected considerable saving by enabling the machine to produce most of the vertical cores in green sand.

The economy resulting from the use of water under pressure is shown by the fact that at a pressure of 750 pounds per square inch a pressure of 12 tons is obtained with a ram 7 inches in diameter, the stroke being 2 inches. The drawing of the pattern is done by a ram 3½ inches in diameter, having an average stroke of 6 inches. This gives a consumption of about one-half a gallon of water per flask, or 15 gallons per hour.

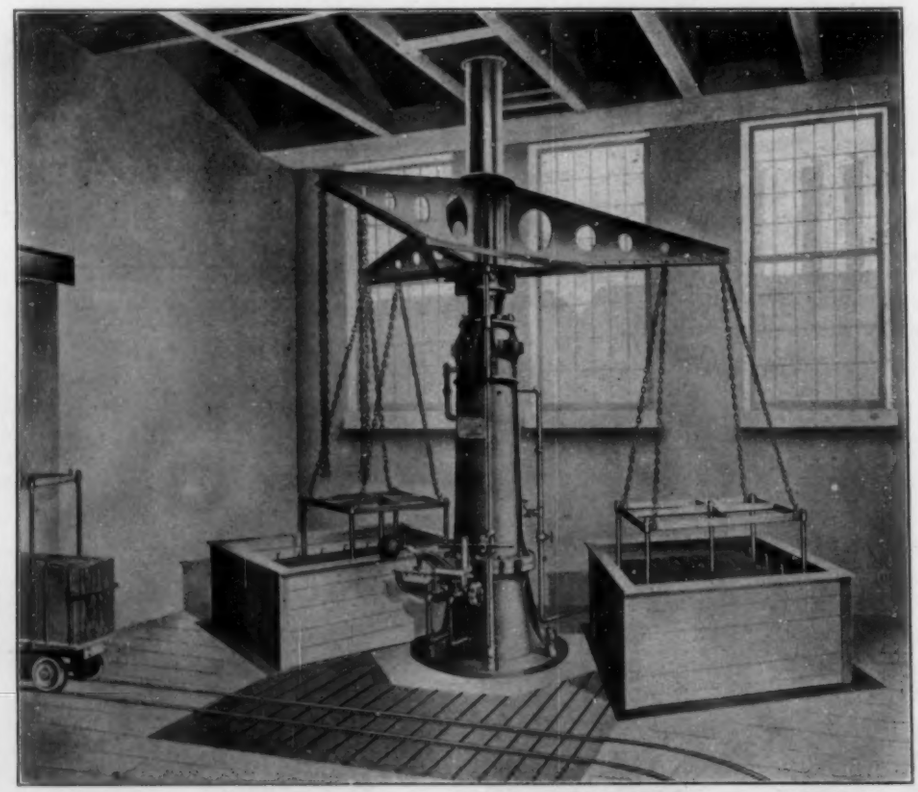
A small, double-acting pump was designed particularly for use with this machine; and pumps of similar design, but single-acting, are also furnished. The single-acting pump is sufficient to operate from three to six machines, working on an average line of work, while the double pump will operate from eight to twelve machines.

The universal machine is very different in design from other molding machines on the market. While this machine can use ordinary pattern plates, it is more especially adapted to the use of a patent improved process for making pattern and stripping plates. It is stated that the use of this complete system is revolutionizing foundry methods wherever it has been adopted.

THE MESTA PICKLING MACHINE.

The Mesta pickling machine, which is stated to be used for pickling about 95 per cent. of the iron and steel sheets used for tin plate purposes in the United States, is here illustrated. These machines are built in various sizes for pickling sheets up to 144 inches in length and 48 inches in width; also wrought iron or steel pipe which is to be galvanized, wire coils, and for various other purposes.

The machine consists of a substantial base supporting a vertical cylinder. The plunger carrying the structural steel arms is a hollow steel tube to which is attached the cast iron piston. Steam furnishes the operating power, and as the control is entirely automatic, the services of a skilled mechanic, as operator, are not required. The machine takes steam only on the up-stroke, the down-stroke being accomplished by gravity and is regulated by means of a floating piston valve, controlling the exhaust as well as the intake. This single stroke feature naturally insures a small steam consumption. With 70 pounds pressure, the machine will handle 2,000 pounds of plates in each of the three crates. The crates are made of acid-proof metal, and vary in size and design, depending upon the material to be pickled.



THE MESTA PICKLING MACHINE.

The machine, designed for tin plate works and for pickling sheets up to 60 x 36 inches, requires a floor space of about 25 feet square, and a height of about 18 feet. The inside dimensions of the two vats are 6 feet 3 inches wide, 7 feet long and 5 feet deep.

Size of crates, 61½ inches square. The diameter of the main cylinder is 18½ inches; total lift of arms, 4 feet 3 inches; diameter steam pipe, 2 inches, and diameter of exhaust pipe, 2 inches. This machine will pickle 16,000 pounds of black plate per hour with 140 pounds of acid per ton of black plates. Maximum load of each crate is 2,000 pounds.

The floor space required for machines arranged for pickling sheets up to 144 inches in length and 48 inches in width, is about 40 feet square and about 22 feet in height. The inside dimensions of vats are 4 feet 4 inches wide, 14 feet long and 6 feet deep. The crates are 37 inches wide and 128 inches long. Diameter of main cylinder, 18½ inches; total lift of arms, 6 feet; diameter of steam pipe, 2 inches; diameter of exhaust pipe, 2 inches. This machine will pickle from 12,000 to 15,000 pounds of long sheets per hour. Maximum load of each crate is 2,000 pounds.

Floor space required and capacity of a machine for pickling wrought iron pipes, wire coils, or other material, depends upon the size and kind of material to be pickled.

These machines are built by the Mesta Machine Company, of Pittsburg, Pa.

THE NEW WESTON ELECTROPLATER'S VOLTMETER.

The Weston Electrical Instrument Company, of Waverly Park, Newark, N. J., have brought out a new voltmeter intended particularly for the use of electroplaters. The amount of current required by a bath depends upon the quantity of work being done, and the current delivered is, of course, dependent upon the voltage. Owing to the comparatively high first cost the plater hesitates before providing each tank with a voltmeter. The Weston Company have, therefore, designed a voltmeter espe-

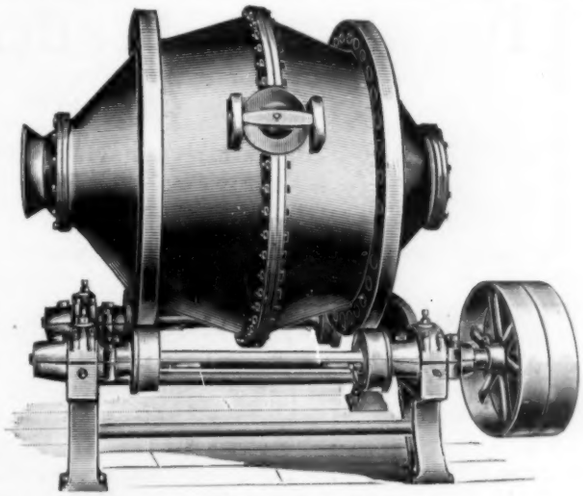
WESTON VOLTMETER.

cially adapted to this work and which obviates the necessity of having an instrument for each tank. The instrument consists of an accurately calibrated Weston voltmeter contained in an airtight, waterproof case, which protects the internal mechanism from the action of fumes of the plating room. The case is mounted on a small wooden switchboard containing 15 binding posts and a 14-point switch. One of the binding posts, marked "plus," is attached to the positive side of the plating generator or line, while the remaining posts are to be attached one each to the cathode side of each tank. After the connections are made the voltmeter is thrown in circuit with any desired tank by turning the switch handle to the numbered point corresponding to the tank it is desired to test. The instrument is designed to accommodate 14 tanks, which is considered the maximum number that can be conveniently operated from one point.

THE MONARCH COMBINED CRUSHER AND PULVERIZER NO. 3.

This machine is designed for use in large brass foundries, and smelting works, where there is an enormous amount of foundry ashes, skimmings, slag, dross, sweepings, sole brick, etc., containing metal to be cleaned.

The barrel of this machine is made of cast-iron 1 inch thick, with a very hard steel lining 1½ inches



MONARCH CRUSHER.

thick inserted. It is also equipped wtih crushing rollers made of hard steel, weighing 1,640 pounds. The machine complete weighs 6,500 pounds.

It has more than twice the capacity of either of the maker's smaller machines, which require 1¼ horse power to operate, while the large machine requires but 2 horse power to operate. This small amount of power, which is necessary to drive so large a machine, is rendered possible by the use of roller bearings, besides, the machine rests on rollers, and is not operated by gears. This is a point which should interest everyone who may have use for a crusher and pulverizer.

It is claimed there is no other machine on the market which can accomplish as much work, in the same amount of time and with so little power, as the "Monarch."

This crusher is built by O. J. Mousette, of Driggs avenue and North Tenth street, Brooklyn, N. Y.

The Vennerbeck & Clase Company, of 59 Page street, Providence, R. I., are selling a special grade of rolled gold plate for the use of sheet metal spinners. The base of this plate is a copper alloy, which is said to have about the same ductility as gold. The plate is furnished in any grade from 10 to 40 karat, and in proportions from one-tenth to one-hundredth of gold to the base metal. The manufacturers claim that the plate can be spun into various shapes with few annealings, and it is used largely by manufacturers of collar buttons, umbrella handles, pipe mounts and general metal goods.

According to United States consular reports rough diamonds have been found in Queensland, one purchased weighing 4½ carats while many others weighing from 1 to 5 carats have been sold. Diamonds so far found have not been sufficient to cause excitement and European and American gem merchants have adjudged them as inferior quality; this has discouraged exploration.

OLD SERIES VOL. 13, NO. 4. NEW YORK, APRIL, 1907. NEW SERIES VOL. 5, NO. 4.

THE METAL INDUSTRY

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THE ALUMINUM WORLD
THE BRASS FOUNDER and FINISHER
AND
ELECTRO PLATERS REVIEW

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THE HALL-MARK.

For hundreds of years England has been fortunate in the possession of a system of hall marks. The control of articles made from gold or silver, or the alloys of either, has been under the inspection of the government, as represented by different assay officers located in important manufacturing centers. A wonderful record of honesty is manifested in the operation of these offices during the entire time of their existence. Notwithstanding the vast temptation to issue false reports as to the quality of the materials passing through, the instances of corrupt dealing have been remarkably rare. The result has been the establishment of a reputation for true dealing which has made the hall mark of England accepted and celebrated the world over. It stands for a certain quality, and the quality is invariably accepted as being precisely as indicated by the mark. If there is any exception to this rule it is always on the side of a purity greater than indicated; never is the article inferior to the stamp.

There are two main reasons which have influenced this condition: the government has provided severe penalties for frauds in the marking of articles made of the precious metals, and has been prompt, energetic and unmerciful in the prosecution of offenders. Next, the efforts of the government have been ably seconded by all reputable manufacturers of gold and silver articles, who naturally stand for the exact registration of precisely what the article is composed. These two forces have compelled the would-be falsifier to the exercise of such great caution that he has been forced to walk in a straight manufacturing path. The result of all this will be noted in the next paragraph.

We find, particularly in this country, that there is a misconception as to the real reason for the hall mark. It is not maintained for the protection of the manufacturer or the handler of precious metals; both may be, and are, considered as experts well able to protect themselves against spurious material. But the consumer has no expert knowledge of the article he purchases; his ignorance is therefore recognized by the government, and he is protected in spite of his ignorance. He it is who derives the greatest benefit from the working of the hall mark system; he can purchase just exactly what he wants and can rest assured that the article is precisely as indicated by the mark.

Both France and Switzerland have a sort of embryo method of marking, but each is defective in that its scope is altogether too limited. They are good as far as they go, but are much less comprehensive than the English method; they, in consequence, fail to accomplish

the wide-extending protection they should, and could.

In the United States there is a haphazard and happy-go-lucky lack of all system in the making and marking of gold and silver articles. Rolled plate is rolled plate. Each manufacturer has his own standard or set of standards, but no two agree, and the poor purchaser is mired between the devil and the seller, and the most essential question is, who will deceive him the more. Out of this condition of things has grown the custom of patronizing the maker and dealer who has earned a reputation for strict honesty in the representation of his wares. This species of hall mark is possessed by many concerns in this country, and they treat it as an asset of incalculable value. Their statement as to quality is received without question. It is an illustration of a manufacturer being wise enough to protect the general public in its ignorance. But on the other hand there are many who will not hesitate to sell dipped ware for triple plate, and console themselves with the reflection that there are other suckers besides the immediate purchaser.

There is now a widespread effort in many sections of the country to obtain laws compelling the truthful marking of gold and silver articles. The government, by the act passed by the last Congress, has done what it could, and some of the States have passed laws of like import. The movement is backed by all reputable manufacturers, and it is a foregone conclusion that the results will be in keeping with the character of those taking the lead.

Elsewhere in this issue we present a very exhaustive account of the British hall marks, stating clearly what they are, how determined and the effect of the working of the system. This article can be studied with advantage at this particular time.

THE NEW BRASS ASSOCIATION.

From the time of the last convention of the American Foundrymen's Association held June, 1906, at Cleveland, Ohio, when it was proposed to organize a brass society, THE METAL INDUSTRY has taken pains to record from month to month the progress of the new association, and we are now pleased to state that as the time for the first meeting draws near the interest is increasing in the proceedings of the first convention. The association has a start of 340 members before it has held a single meeting and with this membership there is every promise that a good healthy society will be born in Philadelphia. What is needed to make the association an unqualified success is for every one who believes in trade associations for the betterment of their industry (and all progressive men do) to attend the Philadelphia meeting and do whatever they can to help the cause along.

The question of getting papers for meetings is usually more or less difficult, and while almost everyone is glad to listen to what the other fellow has to say, he, for various reasons, business or otherwise, would prefer not to write anything himself. Of course, every one cannot take that stand for if they did no matter of interest would be presented at conventions. Therefore, it behooves everyone who has anything of interest to say to come forward and say it. We are pleased to report that several papers of value have already been promised, and probably more will be in hand at the time the convention meets. Further progress of the society will be found on our page of "Associations and Societies," and more will be said as the plan and scope of the association develops.

Membership in a society of this character cannot but result to the advantage of all those joining. The social, commercial and strictly technical features are present, and from one or the other of these a benefit must be derived. This is an age of millionaires and societies, and while we cannot all belong to the first class we can and should be an integral part of the second.

A UNIQUE HARDENING ROOM.

The Waterbury Farrel Foundry and Machine Company, Waterbury, Conn., manufacturers of machine tools, have fitted up recently a hardening room which has many unique devices and appliances. The room was planned and equipped by the engineering force and mechanics of the company, they designing and building the furnaces, tanks and general equipment. The room is situated in a part of their works where it is handy for the various departments, and has a screen door with a sign "No Admittance" thereby none of the messengers can interrupt the workmen while they are engaged in the attentive work of hardening. Coke, coal and charcoal are the fuels used, and each furnace is connected with a Bristol pyrometer, by which the exact temperature is recorded. Likewise the degree of heat in the lead pot is registered by a pyrometer. The water in the various tanks can be agitated by simply turning a valve, bringing the coldest water at different points and also bringing it on the inside of parts to be hardened internally. On the wall of the room is a color chart giving also the degree of temperature at which the different coloring takes place. The tanks are connected with pyrometers, therefore the blacksmith by watching the pyrometer dial can tell whether practice and science agree. The room has an overhead trolley for handling big work and has as well all of the appliances for the smallest work and the necessary operations are all done according to a card recording system which even states the temperature that the steel was tempered. This method is to avoid all arguments about the spoiling of steel in tempering and hardening of which there is always a possibility particularly in the variety of tool steels manufactured to-day. In brief, the room is designed to harden and temper steel by the best methods with the least amount of labor and greatest comfort to the workmen.

TWO NEW WATERBURY MILLS.

Two new Waterbury (Conn.) rolling mills have been producing sheet since April 1st—the Waterbury Rolling Mills, Inc., and the Pilling Brass Company.

The Waterbury Rolling Mills are located near the Watertown branch of the New York, New Haven and Hartford Railroad, and a branch of the Naugatuck River flows by their doors. They, therefore, have at hand two things a mill needs—railroad and water. They have a well-equipped casting shop and mill and are in a position to furnish promptly high and low brass, bronze and German silver in sheets and rolls.

The Pilling Brass Company are situated near the main line of the New York, New Haven and Hartford Railroad and is rolling brass and German silver in widths of 6 inches and narrower and in gauges of .005 and thinner. They make a specialty of platers' metal.

Consumers of sheet metals who have had difficulty in getting a supply owing to the older mills being overcrowded with orders now have two new mills to which they can apply for material.

CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ALL ARTICLES PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

RECOVERING SILVER.

To the Editor of THE METAL INDUSTRY:

In reading over your issue of March, 1907, we noticed an article entitled "Recovering Silver," by Joseph Dimes.

Not in a spirit of criticism, but to make the article clear for those who wish to take advantage of it, we wish to enlarge on certain points. The writer has not only studied this subject thoroughly in theory, but has done considerable practical work in the metallurgy of silver.

Mr. Dimes states that in removing the "fire coat" from silver by dipping in nitric acid, the acid becomes rich in silver. This is perfectly correct, as some of the silver is dissolved, forming nitrate of silver. The article then goes on to say that the silver can be recovered by "washing the chloride"—but it does not say where the chloride is gotten from. The nitrate of silver being a soluble salt, the silver is, of course, in solution, and it is desired to obtain the metal in as small a bulk as possible, therefore it must be precipitated, and this is done by obtaining it as a chloride, which is insoluble in water. This chloride can be obtained from the nitrate by pouring in a solution of ordinary salt; but, as salt water slightly dissolves the chloride of silver, it is better to use hydrochloric (muriatic) acid, which precipitates chloride of silver in the same manner, but does not re-dissolve it. When the chloride has been allowed to settle on the bottom of the vessel, the clear liquid should be poured or dipped off, as it contains nothing but waste acid; before pouring off, however, a few drops more of muriatic acid should be added, and if the liquid remains clear there is no more silver in solution, but if it becomes milky more acid should be added. After the chloride of silver has settled, and the liquid has been poured off, the vessel should be filled with water and the chloride vigorously stirred, using a *wooden* rod, and not a metal one. The chloride should be allowed to settle, and the washing repeated three or four times, to remove all acid; then, as explained in the article, the chloride can be reduced to metallic silver by dilute sulphuric acid and putting in some strips of iron, which must, however, be clean. The article states that this will neutralize the chloride and "reduce the fusion point," but we must beg to say that we do not know what this means. The operation is conducted to change the chloride of silver to metallic silver; the iron, being the stronger metal, takes the acid away from the silver.

It may be asked by the reader why the iron cannot be put right into the original silver solution and avoid all the above details. The original solution, however, contains also copper, and the iron would then throw out the copper and silver together, whereas pure silver is desired. The precipitation as chloride obtains the silver by itself, leaving the copper still dissolved, and this is washed out and poured off. After the iron has been added with acid to the chloride of silver, the latter becomes black, and when it has all become black this means that all the chloride has been changed to metallic silver. And as long as there is any white material remaining the operation must be continued; and if the iron is all consumed, more must be added. This reduced silver is to be washed and dried and melted in a crucible. The article states to add carbonate of potash, but as this is very expensive most people use carbonate of soda, to which it is well to add a *little* of the potash. The writer of the article states that when the melt is completed the silver is allowed to remain in the crucible and chilled. This is all right if the crucible is of sand, but if it is a graphite crucible the melt should be poured into an iron mould, when the silver can easily be detached from the slag with a hammer after cooling. If the melt is allowed to chill in the crucible the latter must be broken to pieces to get the metal out.*

We much prefer, however, another method which is cleaner and quicker, and this is, instead of reducing the chloride with iron and sulphuric acid, to take the chloride immediately after it has been precipitated, wash it and dry it, and mix with an equal bulk of bicarbonate of soda. On melting these the silver is quickly reduced, the carbonate of soda being changed to common salt and the silver being absolutely pure. As stated in the article, the melt must be carefully conducted, and not too much material put in the crucible at one time, or it will boil over; either a good large crucible should be used, or it should only be half full, and the balance of material added later. The melt is not completed until all boiling or effervescence has ceased. Silver thus obtained is absolutely pure, provided the chloride has been washed perfectly clean. When the chloride is reduced with iron or zinc the latter metals are liable to get into the silver and render it impure.

A CHEMIST.

March 26, 1907.

*The melt with soda should be conducted in a sand crucible, as soda ruins a plumbago crucible; but the latter can be used with silver produced by the iron method.

NEW BOOKS.

Crucibles: Their Care and Use. By John A. Walker. Illustrated, 40 pages. Joseph Dixon Crucible Company, Jersey City, N. J., publishers.

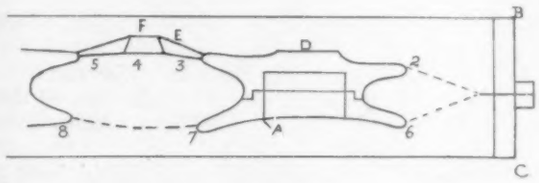
This is an exceedingly handsome booklet, devoted to graphite crucibles. Naturally the author starts with graphite, describes its characteristics and dwells upon the reason for its use for crucibles. That part is all preliminary and serves merely to introduce the main topic—the crucible itself and the service it is intended to perform. The author, speaking from an experience of forty years in the crucible business, handles the subject of the proper use of crucibles and the danger following their abuse, from the standpoint of an expert. It may be assumed as a fact that crucibles are perfect when they reach the user, and that subsequent trouble is the fault of the user. The booklet gives rules for the annealing of crucibles and presents directions for the use of tongs, and describes their correct shape and how they should be handled. Having fully covered this part of the subject there is a discussion of the various fuels employed in melting and their effect upon the crucibles. There are also given formulas for many commonly used alloys; the comparative value of different fuels, and much other information of great assistance to the foundryman. The double-page center of the book carries an exceedingly vivid and realistic foundry scene. The other engravings throughout the book are photographic reproductions which add vastly to the value of the text.

CORRESPONDENCE

IN THIS DEPARTMENT WE WILL ANSWER QUESTIONS RELATING TO THE NON-FERROUS METALS AND ALLOYS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

METALLURGICAL.

Q.—We are asked to estimate the cost of tools and patterns for the making of special trolley wheels and are sceptical concerning our proposed method for molding them. In the sketch, B and C are the half flask; D, E and F are respectively the pattern, gate and tail end of runner of the proposed gated patterns (four patterns per flask). The half wheels A are loose pieces. On



the hard match the parting line would follow 1, 2 around rim of wheel to 3, 4, 5, etc., and a second parting made in the green sand at 1, 6, 7, 8, etc. Is there a method of molding more rapid than this?

March 1, 1907. J. B. A.

A.—This question we submitted to a well known founder, who replied as follows: In regard to holding trolley wheels a faster method would be to make them on a molding machine. This could be done by putting them on a stripping plate with a shaft running through the centre. This shaft could also answer as a core print. The patterns are fastened to the shaft at equal distances apart, and a crank is placed on the end of the shaft. The line of patterns is fastened on the stripping plate; then by turning the crank the patterns will turn. In constructing the pattern it would be well to allow 1-32 of an inch over one-half of the wheel, to be used as a pattern, and to bevel the edges which project above the plate. This will leave the pattern project 1-32 of an inch above the plate when the wheel is turned down. With care the mold can be lifted off without breaking. By this method from 10 to 12 castings can be made in one mold instead of 4.

Q.—Could you instruct me how to melt a small quantity, say 10 or 12 ounces of silver?

A.—Place the silver and about a tablespoonful of carbonate of potash in a crucible and place in the furnace. It will melt at about 1,750 degrees, when it can be poured. A very good and practical way of telling the proper heat of silver for pouring is to take a steel rod and dip it into the mtal; if sparks fly from it when it is withdrawn the metal is hot enough for casting.—J. D.

PLATING AND FINISHING.

Q.—Can you give me a good backing for mirrors after they have been silvered?

A.—Mix dry red vermillion with French varnish cut in wood alcohol. Flow this over your mirror backs and when thoroughly dry apply a second coat, which may be put on with a camel's-hair brush.

Q.—Will you please give me the exact formula for etching 14kt. solid gold goods electrically and not with acid; also, what is used to oxidize must be the up-to-date system.

A.—For electro-etching of gold use a solution of aqua regia, 2 parts muriatic acid and 1 part nitric acid. Dilute this with water to produce a 3 per cent. baume solution. Use as a cathode a sheet of pure lead. The articles themselves should serve as the anode. All that is necessary is to use a reverse current to the regular plating bath. You do not state what color you wish to oxidize; slight deposits of copper or silver will produce a base for the various dark oxidizations.

Q.—I would like some information in regard to French gray finishing. I have tried to finish on copper and bronze, but have not succeeded.

A.—In the issue of THE METAL INDUSTRY for April, 1905, is an article on "Oxidized Silver and French Gray," and in June, 1906, one on "Matching a Sample in French Gray," both by Chas. H. Proctor.

Q.—(1) Can you give me a remedy for blistering of a copper and brass solution? (2) Also how can a green effect be made on brass plated work after it comes from the tub?

A.—(1) The frequent cause of blistering of deposits in brass or copper solutions is a too concentrated bath or an excess of cyanide. Solutions of this nature work better when they do not exceed 10 or 12 degrees in density, Baumé. We would advise you to reduce your solution with water first; if the blistering still continues, too much free cyanide is present. Add plastic carbonate of copper until free cyanide is reduced. (2) To produce a green color upon the brass after plating make up a solution of 1 pound sulphate of copper and 1 pound sal ammoniac in 2 gallons of water. Immerse your articles in this, when a dark olive green color will result. While moist stipple with a brush moistened with a solution consisting of 1 ounce carbonate of copper, 2 ounces water ammonia and 24 ounces water. This will produce the Pompeiian green. When dry dip lacquer in the usual manner and dry thoroughly.

Q.—We are making hard white metal purses and would like a recipe for oxidizing them black. It must not be painted on, nor must it get inside. The raised parts are then polished. The purses must not get any deposit of metal before.

A.—We presume you refer to Germany silver under hard white metal. It is impossible to apply an oxidizing solution to give you the results you desire without previous plating of the surface or preparing a solution to give an oxidized surface. But in both cases you would get a deposit inside unless you applied a stopping out varnish. We would suggest the following method, which gives good results in producing antique effects in brass, copper and silver. Prepare the articles, polished and lacquered in the usual manner. Then apply dead black Jap-a-lac, which can be purchased in any paint store;

thin with turpentine, or a mixture of turpentine and boiled linseed oil. Apply with a fine brush, and in a few minutes the black can be removed from the high lights without affecting the lacquer. Finish with a clean rag. This dries hard and rapidly and gives a platinum black effect.

Q.—We enclose sample of what is termed in this country (Birmingham, Eng.) "antique bronze" or "iridescent bronze." From what knowledge we have it can only be produced on real bronze or gun metal. The articles are polished to a fine surface first, and then undergo a process of heating, which turns the surface to the same color as the one we send you.

A.—The most satisfactory method of producing the finish would be to proceed as you have suggested. Cleanse the articles exactly as for electro-plating; then obtain a slight deposit of lead in a bath consisting of 2 ounces acetate of lead and 4 ounces caustic soda in each gallon of water. Use an anode of lead. Make a slight contact, sufficient to produce a flash of lead. Dry out carefully. Prepare a bath of molten nitrate of potash—the saltpetre of commerce. An iron crucible should be used for this purpose. Wire up the articles and immerse until a brownish drab is produced; remove and cool in paraffine oil. Afterward slightly polish upon a very soft buff wheel, using a little powdered red rouge mixed with grain or wood alcohol to obtain the iridescent effect.

Q.—I would like a formula for statuary bronze on cast and rolled brass.

A.—It will be necessary to first coat the brass slightly in a cyanide of copper bath. Then prepare a solution consisting of 5 gallons of water, 1 ounce of sulphuret of potassium and 1 ounce ammonia sulphate. This produces a slightly smoky effect. Dry out thoroughly and scratch brush dry with a soft brass scratch brush and you will have a beautiful statuary bronze finish. Use the solution cold.

Q.—I made a black nickel solution according to the formula given by Charles H. Proctor in THE METAL INDUSTRY of February, 1905, but it does not work satisfactorily in that the deposit is not black enough.

A.—We would refer you to "Criticism and Comment" in the January number of THE METAL INDUSTRY, 1907, where you will find an improvement in black nickel baths as used practically by Mr. Proctor. Your present bath can be made to produce results by adding water ammonia, probably 4 to 6 ounces to 5 gallons solution and adding 1 ounce bisulphite of soda. Also use anodes of soft sheet brass. By following this method you will get excellent results. The current should be very low, since with an excess you will get the results you mention.

Q.—Noticing in your January and February issues the use of glycerine and transparent glue in acid copper solutions, would you please state what effect they have on the said solutions?

A.—Small additions of these materials to acid copper baths produce smoother and more adherent deposits, increasing the tensile strength and overcoming brittleness of the deposit. It is necessary to increase the voltage slightly, but the solution under such conditions appears to have better conducting power.

Q.—We find there are some impurities in our silver bath. The deposit is very cloudy, but when the current is reversed this defect disappears. We also notice that when the goods are dipped in very hot water the cloudy effect vanishes. Kindly tell us how to improve this bath.

A.—Your silver solution probably contains an excess of potassium carbonate. At certain intervals it would be advisable to add ¼ to ½ ounce of a 3 or 5 per cent solution of hydrocyanic acid; this will neutralize the free carbonate of potash. It is advisable to make this addition on Saturday. Thoroughly mix in the bath so that by Monday the solution will be in a normal condition. Three to 4 ounces cyanide of silver with an equal amount of c. p. cyanide will give a satisfactory silver solution for plating britannia metal.

Q.—Do you know a formula for producing royal copper without heating?

A.—Royal copper depends upon the formation of a heavy oxide, which can only be accomplished satisfactorily by coating with a flash deposit in a bath consisting of 2 ounces lead acetate and 4 ounces caustic soda to the gallon, using a lead anode. Then immerse in a fused bath of nitrate of potash melted in an iron crucible. Imitations are produced with lacquer; also with antimony sulphide 1 ounce, carbonate of potash 4 ounces, and water 3 gallons; also by dilute solution of hydro-sulphuret of ammonia, ¼ ounce in 2 gallons of water, immersing and scratch-brushing to get the desired color. Lacquer afterward.

Q.—Have been replenishing my nickel solution. I used the double salts of nickel and thought the solution too acid, so I used carbonate of ammonia. The result was not satisfactory, as the work comes out cloudy and there is a copious display of bubbles. Blue litmus shows plenty of acid.

A.—Your nickel solution should not stand higher than 6 Baumé in the winter time for good results. Your bath is evidently low in metal; add 2 ounces single sulphate of nickel to each gallon and you will find the solution working all right. Avoid the use of carbonate of ammonia—use only ammonia water for neutralizing purposes in nickel baths.

Q.—We have a contract to furnish verde antique finish on cast-iron, copper-plated, ornamental iron entrances, vestibule and elevator enclosures of an office building, and would like to know of a mixture to give this result that can be applied with a brush. The entrances are more or less exposed to the weather and the finish must be more lasting than inside work.

A.—We are of the opinion that upon cast iron the pigment method of producing the verde antique finish would prove most satisfactory. This can be accomplished by producing the desired tint, and, when thoroughly dry and hard, use a sand blast to obtain the dead effect. The following formula might possibly answer your purpose: After copper plating, oxidize the parts for verde antique; then apply the following solution with a brush. Allow to dry and repeat the operation, if necessary. Afterward lacquer by dipping in a hard, transparent lacquer:

Hot water	10 gals.
Sulphate of copper	1 lb.
Sal ammoniac	1 lb.
Sea salt	1 lb.
Sulphate of zinc	2 ozs.
Acetic acid, commercial	12 ozs.

Thoroughly dissolve and apply as directed.

Q.—Please tell me how to obtain the colonial brush finish on bronze.

A.—To produce a brush brass finish upon a bronze plate it will be necessary to brass-plate it first, unless you desire the brush effect in bronze. To produce the finish prepare a cut-down finish with tripoli. Clean the articles in the usual manner and brush with a crimpled wire scratch brush, the wire of which should be dead soft. This brush should be about 5 inches in diameter and 4 rows wide, and run at a speed of 1,000 to 1,200 revolutions per minute. Keep the work wet with water, to

which is added a little washing soda. Moisten the brush with powdered pumice stone and water. Brush lightly and the dead lustre will be produced. Wash carefully, pass through the cyanide dip, dry out and lacquer with a dip lacquer.

Q.—We enclose a copper part with which we are having trouble. When the goods are supposed to be finished the solder shows up black. We have tried painting this with a copper leaf paint and find the operation is very expensive and it does not show up well on the finished goods. Kindly tell us of a quick copper plate or strike that will completely plate the whole post.

A.—The most satisfactory method of overcoming the trouble would be to copper plate them in an acid copper solution, then redip in the bright dip. We return your sample, which we finished in this manner. The time of immersion was 10 to 15 minutes. We advise you to prepare an acid copper bath by dissolving 1 pound sulphate of copper in each gallon of water and add 3 ounces commercial oil of vitriol; 1 or 2 ounces of glycerine should be added to every 50 gallons of solution. Use anodes of soft sheet copper. Dip your copper parts in the usual manner; have frames to hold 100 or more pieces and frame them while wet. Run through the cyanide cleaning solution and plate for 10 minutes. Remove, pass through the potash. Do not wash, but drain well and bright dip in the usual manner. A solution of plater's compound, used hot, 2 or 3 ounces to the gallon, is very effective in drying out copper goods. Rinse in boiling water and dry in sawdust.

Q.—I am working a copper solution for plating iron which stands at about 15 degrees. It is made up of the following: Carbonate of copper, cyanide of potassium and bisulphite of soda. The plate shows minute blistering and it will not stand exposure to the weather.

A.—We are of the opinion that your copper bath is too rich in cyanide for plating iron. This will always cause blistering; oftentimes when depositing upon brass this will occur. Ammonia is unsatisfactory for copper baths as it produces the suboxide of copper which also produces blistering. The soda salts are best in the form of sodium sulphite or bisulphite. Copper-coated iron, to stand the action of the weather, must have an unusually heavy deposit of copper; this can be obtained by the aid of the acid copper bath. One or 2 hours immersion will produce more copper in the acid copper than could be obtained in the cyanide bath in 10 or 12 hours. Cuprous copper or red copper compound can be used successfully in cyanide baths; this compound prevents blistering to a large extent.

Q.—I would also like a good mercury dip.

A.—For a good mercury or blue dip dissolve 2 ounces cyanide of potassium (c. p.) in each gallon of water and ¼ ounce yellow oxide of mercury.

Q.—Can you give me a formula for etching gold?

A.—Prepare a solution of aqua regia in water; let it stand from 3 to 5 Baume and use a good strong current. The articles to be etched should be the anode, and sheets of pure lead or gas carbon the cathode. This method is just the reverse of plating, but the wires can be so connected that the articles are always between the cathode plates or entirely surrounded by them. Aqua regia consists of 1 part hydrochloric acid and 2 parts nitric.

Q.—In trying the formula on electro-etching on gold I find that I get a hard deposit resembling lead on the parts of the gold to be etched. I am working this process with bichromate of potash and sulphuric acid batteries and the deposit is rather slow.

A.—Your trouble may be due to impure lead which probably contains some zinc. If you cannot obtain this pure use gas carbon. If the etching is slow strengthen your solution, and, if possible, increase your current strength. A dynamo is best for the purpose. The etching by this process should be accomplished very quickly.

Q.—We want to produce the dull or dirty appearance on low parts. High parts can, we presume, be produced by scratch brushing.

A.—The rusty green gold you refer to is produced by first silver plating in a weak solution of silver with a large excess of cyanide. The high lights are then relieved in the usual manner and gilded in the green gold solution.

Q.—How is the finish produced on the medal we enclose? We have a large number to finish and would like to know how to do it.

A.—Proceed as follows: Prepare a mixture of pulverized red oxide of iron and water to the consistency of a thick cream. Coat the medals with this, either by immersion or by painting with a camel's hair brush. Allow to dry and then place on an iron plate and heat evenly over a charcoal fire or in a gas muffle until the color is produced. Allow to cool and brush lightly with a waxing brush; this is similar to a plater's hand brush, but made from goat hair. The brush should be passed over a cake of beeswax occasionally to get the lustre. Lacquering is not necessary. The coating formed is hard, similar to royal copper. The sample submitted is made from copper, the discs being highly polished before stamping as it is impossible to produce the polished surface after the medal is stamped.

Q.—Will you kindly let me know how to get an old gold color, rose gold, blue, steel, red and bright green? I have some formulas, but would like some new ones.

A.—The old gold effect can be produced by the usual dipping in the bright dipping acid. Then immerse in a well used potash bath, relieve with pumice stone, dry out and lacquer with a bright gold lacquer. The rose gold is produced by bright dipping, lacquering with a light gold lacquer and when thoroughly dry applying a thin mixture of powdered oxide of iron and chome yellow dissolved in turpentine and a little turpentine copal varnish. Then wipe from the high lights with a rag and dry in the usual manner. The steel can be obtained by oxidizing the coppered surface or by depositing. Solutions for this work were given in the January issue of THE METAL INDUSTRY. The blue, red and green are obtained by lacquer or pigments applied in the manner above given.

Q.—Kindly give me a stop out varnish that will stand about 185 degrees; also tell me how to remove it. I want to plate rose and green on the same article.

A.—A good stopping off varnish is prepared by using common air drying japan thinned with benzole. After applying dry with heat for a short time and allow to harden in cold water. This varnish may be removed with benzine. If this does not prove satisfactory prepare a varnish by dissolving gum copal in acetone, similar to a lacquer, and add a little aniline blue so the varnished surface will be distinct. Allow to harden. This may be removed after gilding by a clean potash used very hot or by wood or denatured alcohol, or any gum solvent.

METALLURGICAL DIGEST

A REVIEW OF METALLURGICAL MATTERS OF THE WORLD.
TRANSLATED AND EDITED BY HOWARD GREEN BAYLES, MET. E.

GAS-LIGHTING ALLOYS.

The *Journal des Usines de Gaz* publishes the results of a series of interesting experiments, leaving it to the ingenuity of its readers to turn the facts to practical value.

The property of producing spontaneous combustion by the absorbtion of particles of a gas, usually considered to be especially characteristic of the metals of the rare earths, leaves them entirely when they are in a chemically pure state. It is at its maximum when foreign elements are present in considerable quantity.

When the metals are alloyed, especially with iron, this pyrophoric property becomes stronger. It increases with the percentage of iron, and reaches its maximum when there is 80 per cent iron in the mixture. From that point it decreases and disappears when the iron reaches 75 per cent.

It has also been established that these alloys instead of being like the rare metals they contain, are hard, tough and almost unaltered in air. The iron may be partly replaced by cobalt, nickel, manganese or by a mixture of these metals. The entire replacement of the iron, however, renders the alloy in almost every case completely inert. These alloys behave differently, depending on which of the rare metals they contain. Lauthanium gives the best results from the point of view of the beauty of the glow produced. The alloys of cerium throw off sparks that make it useful in gas lighting. An alloy of 50 per cent. Lauthanium, 20 per cent. of iron and the remaining 30 per cent. an alloy of Neodymium, Praseodymium and Cerium gives superb luminosity. An alloy of 60 per cent, cerium, 30 per cent. iron and 10 per cent. other rare metals of this group has also produced very brilliant effects.

It is easy to utilize alloys of the type of cerium, iron and rare earths in the manufacture of self-lighting incandescent gas mantles. It is only necessary to fasten the fragment of alloy in the proper place near the top of the mantle.

These alloys are being prepared to-day in the Welsbach laboratories at Treibach, in Corinthia.

NOTES FROM FOREIGN PAPERS.

The bulletin of the Belgian Chemical Society describes an ingenious method of electroplating, which, for a limited class of work, should prove very satisfactory. Instead of employing a bath of electrolyte and immersing the article to be plated, a sponge, dipped in the same solution, is used. The sponge is fastened to a small piece of the metal that is to be deposited, and this in turn is connected with the positive pole of a 110 volt direct current circuit. The article to be plated, after thorough cleaning and drying, is connected with the negative pole of the same circuit. The sponge is passed slowly over the parts that it is desired to plate. Where only parts of an article are to be plated, this method permits the worker to dispense with a carefully applied protective coating over the other parts, and where economy is especially sought, should prove very satisfactory. Naturally, where really good work is to be done, the old method is the only one to use, as this will give only the very lightest surface coloring.

Der Metallarbeiter is asked by a correspondent for a method of "cementing," or giving a brass finish to copper wire. The advice given is to give the copper billet a brass surface before drawing it into wire. This is done by putting the billet into an iron box with some pure granulated zinc and some salammoniac. The box is then sealed airtight and heated. The vaporized zinc is absorbed by the copper, forming a surface alloy of brass. A billet so prepared may be drawn into very fine wire, every part of which will be brass-covered. Silver gilt wire may be made by gold plating a silver billet before drawing. Gold is the most ductile of metals, and if it forms a complete envelope to the billet, even a very thin one, the wire will be gilded its entire length.

J. Schiele, in the *Zeitschrift Electrochimie*, describes a method of preparing iron objects for electro-plating. He first uses the object as anode in a bath of a mixture of moderately concentrated nitric and hydrochloric acids. A carbon cathode of much larger surface is used. The current density is three-quarters to one ampere per sq. in. After a few minutes the iron object is removed, washed and wiped, and is then given a thin coating of the desired metal in an acid bath, using the metal as anode. Electric deposition in the usual manner follows. This method is said to give platings that adhere very well.

The *Elektrochemisher Zeitung* describes a method of recovering nickel and copper from such scrap sheet metal as is made in the manufacture of cartridge cases, small boxes, etc. The scrap is cleaned by tumbling with caustic soda, lime and sand, and then washed. It is then put into suitable baskets and used as the anode in an electrolytic bath. Sheet lead is used for a cathode. One more cathode than the number of anodes is used. The bath is made of about 20% dilute sulphuric acid. By using a current of 1.2 volts, the nickel is all plated on the cathode plates while the copper drops to the bottom of the bath as a slime. This is removed from time to time, washed, reduced in a crucible and refined. The bath gradually takes up a considerable amount of nickel and iron, with a little copper. The copper is first recovered electrolytically, using carbon electrodes, and the solution is then evaporated to dryness. The nickel is recovered from the resulting salts by chemical methods.

Metallurgie, a German magazine of the highest scientific standing, publishes the description of an alloy said to furnish a satisfactory substitute for platinum in electrical instruments. Its formula is:

Nickel	72.0 %
Silver	23.57%
Bismuth	3.72%
Gold	0.71%

The *English Mechanic* describes a very cheap and efficient device for rapidly melting lead. A gas pipe is bent nearly into a circle, the end stopped and a number of small cuts made with a saw. To the open end of this is attached a ¾-inch gas pipe, with gas at 5 lbs. pressure. A ½-inch air pipe is also brought in on a T, and the circle lies in the bottom of the melting crucible. Combustion is thus maintained in direct contact with the metal to be melted. The lead should be poured as soon as it is melted, or an undue amount of dross will be formed.

A good brass polish is made by adding to two quarts of distilled water 3 oz. of powdered rottenstone, 2 oz. of powdered pumice and 4 oz. of oxalic acid. Allow to stand a day or two and shake before using.

Pierre Berthelot, the famous French scientist, died suddenly on the 18th of March. He was the pioneer of modern synthetic chemistry. In 1870 he did much to assist the defence of Paris by his invention of nitroglycerine and dynamite. He is said to have been in great measure responsible, by his aid and encouragement, for the splendid work done during the past few years by M. and Mme. Curie, the discoverers of radium. Beside his scientific work, M. Berthelot had occupied a number of government offices, and was a senator at the time of his death.

A gray finish can be given to brass as follows: Clean thoroughly with alcohol. Immerse in a solution of 1 oz. of arsenic chloride to 1 pint of distilled water until the desired color is obtained. Wash in clean, warm water, dry in sawdust, and finally in warm air. Then fix the color by protecting it with a lacquer made of bleached shellac and wood alcohol.

Associations and Societies

REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN BRASS FOUNDERS' ASSOCIATION.—President, Charles J. Caley, New Britain, Conn.; Secretary, Dr. Richard Moldenke, Watchung, N. J. The program for the organization of the society which is to hold its first meeting on Wednesday, May 22, 10 A. M., at the Second Regiment Armory, Philadelphia, is progressing as well as can be expected in these strenuously busy times, when everyone has such little opportunity to give attention to anything but business. However, during the past month both the President and the Secretary have taken steps toward arranging for the formation of the new association and a definite program will be drawn up within a month in ample time to be ready for the coming meeting. Some 340 individuals, the active leaders in the brass industry, have signified their interest in the association and with a good attendance of these members there is no doubt but what the association will be a success.

NEW ENGLAND MANUFACTURING JEWELERS' AND SILVERSMITHS' ASSOCIATION.—42 Weybosset street, Providence, R. I.; President William A. Copeland; Secretary, H. M. Mays. The association has weekly meetings of the advisory council and such topics are introduced as are thought to be of interest to the members of the association generally. At present they are discussing "parcels post" and also "a State stamping law," which is to be a duplicate of the national stamping act which was passed at the last session of Congress.

The officers of the Association visited Attleboro recently and held a meeting, inviting all who were eligible to membership to hear what they had to say and to learn what they were doing for the trade in general. The meeting was a success and several new names were added to the mmbrship. Another meeting will be held in North Attleboro soon. Next season it is the purpose of the Association to give a series of "smoke talks" in Providence and invite all those who are eligible to membership. In the experience of the Association it has been found that in this way they can get closer to prospective members than by any kind of writing. Furthermore it gives the members of the organization who will be called upon to make addresses an opportunity to rehearse themselves in their work, and thereby become more familiar with the real problems they have to contend with. In the regular noon meetings of the Association they are discussing "parcels post" and also have appointed a committee and have introduced in the Legislature of Rhode Island a stamping law for jewelry, which is an exact duplicate of the National Stamping Act passed by the last Congress. It has also been found in cases where complaints have been made in regard to slow deliveries of express matter, that express companies act quicker and with more effect when they are waited upon by a committee from the Association, than when individual complaints are made.

The Executive Committee of the Foundry Supply Association held a meeting at Cleveland, Ohio, March 30th, there being present President S. T. Johnston, Henry E. Pridmore, U. E. Kanavel, J. S. Smith, H. E. Mills, E. A. Kebler, J. S. McCormick and H. M. Lane.

President Johnston and the Secretary first reported the results of a recent trip to Philadelphia, where they had had a meeting with Messrs. E. H. Mumford and Howard Evans, of the Executive Committee of the Supply Association, and with Dr. Brown, representing the entertainment committee of the Philadelphia Foundrymen's Association. It was reported that the Philadelphia Foundrymen's Association, through their committees, would look after all of the arrangements for entertainment in connection with the convention, but would leave the exhibit matters wholly to the exhibit association. The sessions of the American Foundrymen's Association and the exhibit will be free to all, but the entertainment (consisting of the shad dinner and river trip, smoker, etc.) will be confined to members of the American Foundrymen's Association, members of the Foundry Supply Association, the Associated Foundry Foremen, the Philadelphia Foundrymen's Association and such individuals as come to Philadelphia to join the Brass Foundries Association. The members of the Foundry Supply Association are, of course, members of the American Foundrymen's Association also, and any member of the Supply Association is entitled to two representatives, who can partake of all of the entertainment features. Attention was called to the fact that the constitution of the Supply Association also provides that any firm can have additional representatives present by paying $15 per person, which will entitle them to all of the privileges of the convention, including entertainment.

Representatives or employes of firms who simply attend the exhibit as clerks, demonstrators, etc., but do not partake of the entertainment will not be considered as representatives in the sense that those who partake of the entertainment, and such employes will not be registered in the regular attendance list. On account of the fact that the exhibit will be open continuously throughout the day and evening, it will be necessary for the supply men to have some one in attendance at their exhibits at all times during which the Armory is open, if they wish to be demonstrating.

It was reported that the Philadelphia Foundrymen's Association had brought up the subject of asking for subscriptions from the supply men throughout the country. The principal object in the organization of the Foundry Supply Association was to do away with the old irregular practice of asking subscriptions, in accordance with which the burden fell very unequally upon the supply trade, and it was pointed out that no members of the Supply Association would be under obligations to make a separate contribution. It would, however, be in order for the Philadelphia Foundrymen to ask contributions from supply men not members of the Association, but such contributions made direct to Philadelphia would not entitle such supply men to any of the privileges of the exhibit.

The finances of the Association were carefully considered, and it was shown that, according to present indications, there is going to be a sufficient amount of revenue from the rental of space to cover all of the expenses of the exhibit. This matter was gone over in detail by the Committee and a careful estimate made of the balance of the expense which will be likely to be incurred.

The Secretary was authorized to engage music to be in attendance at the Armory during the exhibit, providing the amount of space sold aggregated $2,450.

It was voted that the Secretary furnish the members with two tickets each, the said tickets to be presented at the registration desk at the time the firms' representatives applied for registration, to secure their credentials for entertainment, etc. If a firm desires additional tickets, it is hoped that they will notify the Secretary previous to the convention, as this will save considerable confusion.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS—President, E. F. Needecker; Commissioner, Wm. M. Webster, 1110 Schiller Building, Chicago, Ill. This association held recently one of the most successful meetings in its career at the Hollenden Hotel, Cleveland, Ohio, on Monday and Tuesday, April 8th and 9th. Nearly its entire membership was present. A committee on Tubular Goods was appointed, consisting of H. J. Geurink, Cleveland, Ohio; A. C. Cogswell, Detroit, Mich.; E. F. Niedecken, Milwaukee, Wis., which are to report at the next meeting. A delegation from the Detroit Brass Manufacturers' Association was sent to the meeting to secure the co-operation of the Association in bringing about some reforms in the trade. They were given a hearing and a committee appointed to co-operate with them. F. K. Dibley of Milwaukee, is chairman of the committee. The association took in several new members and adjourned to meet June 25th and 26th at the Hotel Touraine, Boston, Mass.

ITEMS OF INTEREST TO THE INDIVIDUAL.

MRS. J. P. FANNING.

It is not often that we find a woman in sole charge of a business that is purely mechanical, and one which, in addition, calls for the exercise of the greatest care and skill. It is therefore a pleasure to mention the work now being done by Mrs. J. P. Fanning who, since the death of her husband several years ago, has had direct charge of the business founded by him, not only of the work going on in the shop but also attending to all the details of the business proper. The business is carried on at 678 Jefferson avenue, Brooklyn, N. Y., and comprises the manufacture of molds for casting solder, babbitt metal, buckshot, piano key leads and all kinds of white metal castings.

Before her husband's death Mrs. Fanning adapted herself to some parts of the business, and for two years, during his last illness, looked after the plant. Financial reasons made necessary the keeping going of the factory and the responsibility was assumed without hesitancy. Woman like, the first work was the cleaning, in thorough fashion, of the plant and the discarding of all useless stock. The place was completely renovated and

MRS. J. P. FANNING.

many needed improvements were made. As times were dull this job was not hurried and the results were most encouraging.

The first order received was from the president of the Eagle Smelting & Refining Company to make the molds for the entire plant, which was then building a new factory. This order, which was an exceedingly good starter, was completed to the perfect satisfaction of the company. Since then many new plants have been supplied, such as the Magnes Metal Company, Peerless Smelting & Refining Company, Theodore Hoeffler & Company, Frictionless Metal Company, the Union S. & R. Company, the Great Western Company, etc. At all times there was enough to do to keep the factory fully occupied.

Although at the time of starting there were many bills outstanding, Mrs. Fanning was soon able to cancel them, and new tools and machinery were added to the equipment. These additions were always the best that could be obtained and the work done proves their adaptability.

At the beginning Mrs. Fanning made it a strict rule to have the work done when promised, and to have it done to the satisfaction of the customer. There were troubles at first, but these were only viewed as stepping stones to advancement. Strict attention was paid to business, and the result is now seen in a well-known and firmly established trade, with customers who are thoroughly satisfied with the work they get.

Charles R. Yerrick has been appointed superintendent of the Chapman Valve Manufacturing Company's plant at Springfield, Mass., succeeding Perlie H. Harve, who will hereafter fill the position of master mechanic. Mr. Yerrick entered the employ of the Chapman Valve Manufacturing Company in July, 1905, and has since held the position of chief draftsman, succeeding John P. McLaughlin, who resigned to enter the employ of the Walworth Manufacturing Company in Boston. Mr. Yerrick was formerly in the engineering department of the Philadelphia Rapid Transit Company. It is understood that E. J. Jones, who was for a time superintendent of foundries for the company, will succeed Mr. Yerrick as chief draftsman.

S. D. Benoliel, who was general manager of the Roberts Chemical Company's plant at Niagara Falls, N. Y., for the past five years, is now general manager of the International Chemical Company, of Camden, N. J. While at Niagara Mr. Benoliel took an active part in the development of the process for manufacturing caustic potash and its application in the plating room. The International Chemical Company make a specialty of all grades and kinds of potash, as well as cleansers for the removal of buffing deposits.

W. D. Martin, who was formerly connected with the sales department of the Rome Brass & Copper Company, Rome, N. Y., has become general manager of the Waterbury Rolling Mills, Inc., of Waterbury, Conn.

Philip C. Tennant has accepted the position of general superintendent for Frederick B. Stevens, importer and manufacturer of foundry facings and supplies. Mr. Tennant was with the J. S. McCormick and the Obermayer Company for a number of years.

F. W. Collins, for fifteen years head plater of the M. E. Moore Bronze & Plate Co. and the Colonial Bronze & Silver Co., of Kingston, N. Y., has formed a co-partnership with W. H. Niles and bought out the old C. H. Angus place, known as The Albany Nickel Plating Works, 794 Broadway, Albany, N. Y. They also intend to manufacture a line of novelties. Mr. Collins is one of the best known platers in the country.

Monsieur Ronceray, from Ph. Bonvillain and E. Ronceray, machines, tools, importers and manufacturers of moulding machines, of Paris, is to leave Havre on the 13th of April, with the view of presenting Bonvillain & Ronceray's moulding machines at the American Foundrymen's Association Exhibition, to be held in Philadelphia, May 20 to 24. At the same time he will visit the principal machine tool manufacturers, so as to establish connections for the sale of their machines.

DEATHS.

Theodore D. Buhl, first vice-president of the Detroit Copper and Brass Rolling Mills, Detroit, Mich., died suddenly at the Hotel Waldorf-Astoria, New York, on April 7, where he was staying with his wife and daughter. Mr. Buhl was a leading business man of Detroit and connected with a number of financial and business interests of that city. His death is the second one which has occurred in the management of the Detroit Copper and Brass Rolling Mills within the last four months, they having lost their president, Rufus Woodward Gillett, on December 3, 1906.

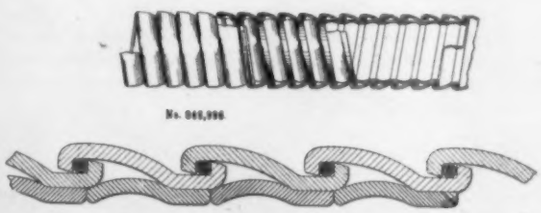
PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

846,480. March 12, 1907. PROCESS OF ELECTRIC WELDING. Laurence S. Lachman, of New York City, assignor to the Standard Pulley Manufacturing Company, a corporation of New York. This invention may be applied to the manufacture of all kinds of utensils in which two metal parts are to be secured together, and whereby the parts of the article may be securely united without the use of bolts, rivets or keys. The inventor has found that a perfect weld may be formed between a thin sheet of metal and another sheet of thick metal by forming points or projections upon the thick sheet and placing these points directly upon the thin sheet and then passing a current of electricity through the two sheets and through the points and pressing the sheets together as the points are fused. This arrangement affords the proper amount of resistance to the current to fuse the metal, so that a perfect union is affected.

846,384. March 5, 1907. LEAD PRODUCT. John W. Bailey, assignor to the United Lead Company, a corporation of New Jersey. This invention has for its object the production of the metal in a form which greatly facilitates its chemical union with other substances. The inventor has discovered that lead may be reduced to the form of a dust or impalpable powder, and when it is subjected to chemical action in this condition it is rapidly and uniformly transformed into the ordinary lead pigments such as white lead, litharge, or red lead, and this without any waste and without rendering it necessary to resort to expensive cleansing or other finishing operation. When the lead is subjected to the action of rapidly moving beaters the material may be reduced to the dust-like form. The longer the beating the finer the result. The beating is carried on in a chamber through which a current of air passes which carries out the finest dust. This process may be carried on with the pure metal or with a mixture of an oxide.

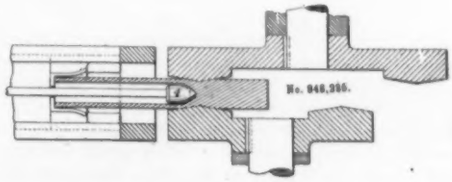
846,996. March 12, 1907. TUBING. E. T. Greenfield, of Kiamesha, N. Y. This invention concerns tubing for inclosing electric conductors. The object is to provide a simple and durable tube which may be readily made in large quantities and which shall be sufficiently flexible to meet the requirements of practical use. The tube is constructed of two concentric tubes, each made of a spirally formed strip of metal. Previous to the



spiraling operation the strip is curved laterally. As a result of this lateral curving each of the strips from which the outer spiral is formed is provided at each edge with a flange, one turned outwardly and the other inwardly, so that the successive spirals formed from each strip interlock and are capable of movement relatively to each other to produce the required degree of flexibility. Within the tube so formed is placed another tube also comprised of successive spirals of a single strip of metal. But the edges of this strip form butt joints and do not overlap. The interior of the tube is, therefore, smooth.

846,851. March 12, 1907. METAL ALLOY. Arthur E. Hobson, of Meriden, Conn., assignor to International Silver Company, a corporation of New Jersey. This relates more particularly to the manufacture of German silver or nickel silver that is composed of copper, zinc and nickel in certain proportions; and the object of the invention is to provide an alloy including the metals just mentioned that may be freely worked and spun without liability of fire cracking. The inventor has found that manganese, when employed in a certain proper proportion to the other metals, the other metals also being employed in certain definite portions, greatly improves the resulting metal. A metal for producing good results should not contain manganese in excess of 4 per cent. of the entire amount nor zinc in excess of 20 per cent. of the entire amount. The nickel and copper may vary, but a relatively high proportion of copper should be present.

848,285. March 26, 1907. BLANK SUPPORT FOR TUBE MILLS. G. H. Blaxter, of Beaver, Pa., assignor to the Pittsburg Seamless Tube Company, of Beaver Falls, Pa. Heretofore in piercing long billets the forward end of the shell has been unrestrained so that it was free to drop down onto the supporting bar of the



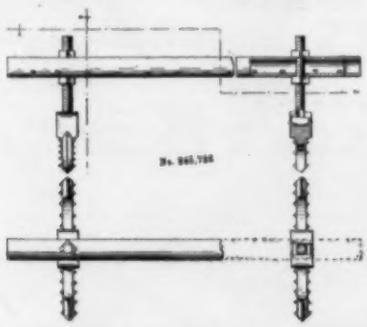
mandrel and to whip violently around it, tending to distort the hollow billet and injure the bar. This invention provides a sliding support for the blank which will guide it uniformly in true alignment as it advances over the mandrel entirely independent of the bar. At the same time a supporting bearing is had for the bar.

846,922. March 12, 1907. PLASTIC SOLDERING PASTE. Newell Sill Jenkins, Dresden, Germany. This paste is manufactured in the following manner: First, reduce a metal—for example, gold or silver—or two or more metals suitable for soldering purposes to a fine powder by precipitation, filing, grinding, or other means. From this fine powder a paste is then made by mixing with it borax in powdered form or in solution, as may be desired, and also a suitable adhesive—such as gum tragacanth, or gum arabic—and to this paste is added sulphuric acid or some other acid. This plastic paste is claimed to have the following advantages: It may be placed exactly where needed, and during heating it will not bubble or increase in volume. It is claimed to stay exactly where it is placed: there is no waste and the finishing of the soldered parts is made easy.

845,919. March 5, 1907. SAND BLAST APPARATUS. E. A. Arcouet, Chicago, Ill. This invention relates to improvements in sand blast machines particularly adapted for abrading purposes. The stream of sand is conveyed through a pipe, and directed with great force against the surface to be operated upon. The device uses compressed air, which is directed into a tank, from which it discharges the abrading material. The machine is claimed to be light in weight, simple and durable in construction and efficient in operation.

845,948. March 5, 1907. SOLDERING COMPOUND. Raymond A. Hall, Dayton, O. This improved soldering compound is claimed to be adapted for use in soldering aluminum by means of tin. It consists of stearic acid, 60 per cent; mutton tallow, 25 per cent; lard (pure), 10 per cent, and paraffine wax, 5 per cent. These are mixed together, allowed to cool, and granulated. In order to solder aluminum, the same may be cleaned by scraping where it is to be soldered. The compound is then applied, and pure tin is used as the soldering metal, and is applied with an ordinary soldering iron in the usual way.

845,786. March 5, 1907. Device for Forming and Holding Sand Cores. B. F. Hobert, of Watertown, N. Y. This improvement relates broadly to devices for forming cores of sand or the like and holding them in molds. Upon a hollow bar may be adjustably mounted any number of supports for holding



the sand which forms the core. At suitable intervals the bar is formed with vents or openings which permit the escape of the gases. Each of the supports consists of a body or head and a hanger by means of which it is adjustably connected to the bar.

845,741. March 5, 1907. Mechanism for Finishing Screw Threading Dies. E. E. Beck, of Chicago, Ill. Assignor to the Nye Tool and Machine Works, a corporation of Illinois. This device is intended for finishing or trimming the thread-forming portions of screw-cutting dies. The various operations are performed in a ready and accurate manner upon the instanding cutting teeth of a screw-cutting die—such, for instance, as removing more or less of such instanding teeth, and the tapering or relieving of such teeth rearwardly from their cutting edges.

847,746. March 19, 1907. Electrical Welding Apparatus. Thomas A. Edison, Orange, N. J. This apparatus is adapted for use in welding together the contiguous surfaces of seams of various forms; and where the seams to be welded are reproduced in the successive articles to be operated upon, the apparatus is capable of a substantially automatic operation, the only manual attention being the proper regulation of the arc. The device has been designed especially for welding the seam formed between the flange of the cover and the upper edge of the sheet metal can used by the inventor for holding the supports, active materials and the electropyte of his storage batteries.

848,284. March 26, 1907. Metal-Working Apparatus. John R. Blakeslee, Jr., Cleveland, O. This invention relates to metal-working machines, and particularly to combined forging machines and presses which are adapted to impart to heated metal various forms through the medium of suitable dies and forming tools. The object is to develop a pressing power of great efficiency and also, in combination with a forging or upsetting machine, to effect both the forging and pressing operations at one heat, and thus reduce the time and cost of manufacture and enhance the quality of the finished article.

848,438. March 26, 1907. Rolling Mill. William H. Brown, Pittsburg, Pa. In rolling thins sheets it has been heretofore necessary to pile the sheets together for the reason that the rolls cannot be forced together by sufficient pressure to reduce the metal to the desired gage. This device provides other means for rolling thin sheets, and does away with packing. In carrying out the invention, one of the rolls is formed with a cutaway portion at one side extending through its entire length. The true circle will be flattened slightly along one side, thus allowing the rolls to be brought together closer by the adjusting mechanism.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

Schimper & Company, sheet metal goods manufacturers, formerly at 60 Union street, Newark, N. J., have removed to Irvington, N. J.

The Vulcan Smelting & Refining Company, of 140 West Twelfth street, Chicago, Ill., now have their main office in the First National Bank Building, Chicago.

The Meriden Machine Tool Company, of Meriden, Conn., have decided to build larger sizes of their forming and turret head lathes that they may be suitable for automobile work.

A. H. Wells & Company, who operate a tube mill on the Watertown Road, Waterbury, Conn., have moved into their new office and now use their old office quarters as a supply room.

The New York offices of Merchant & Company, Inc., manufacturers of babbitt and anti-friction metals, is now located at 224 Pearl street. The company was formerly located at 245 Water street.

The Diamond Machine Company, of Providence, R. I., report that in one month they received orders for $30,000 worth of grinding machinery. They are working overtime to keep ahead of orders.

E. O. Grabo, 180 Centre street, New York City, builder of brass machinery, had a small fire on March 27. The damage was insignificant and was mostly confined to the pattern section of the works.

The Fairfield Aluminum Foundry Company, Inc., who have a foundry at Southport, Conn., have outgrown their present quarters and have started to build a new shop at Fairfield, a neighboring town.

A New England firm which makes a specialty of polishers' and platers' supplies is the Hardware Agency Company, 224 Franklin street, Boston, Mass. They ask the trade to write to them for prices.

The Slipp-Butler Company, of 45 Broadway, New York City, importers and selling agents of ores and metals, have recently extended their business and now handle antimony, antimonial lead, tin, arsenic oxide, etc.

Among the recent sales of the Peck Drop Press Works, New Haven, Conn., are two automatic drops for S. L. & G. H. Rogers Company and two for the sterling silver department of R. Wallace & Sons Company, both of Wallingford, Conn.

The Providence (R. I.) store of the Waterbury Brass Company reports that the first three months of business for this year is the largest they have ever experienced. The store has a tremendous retail trade with the manufacturing jewelers.

Haas Bros. Company, of 736 Broad street, Newark, N. J., are the selling agents for the well-known "Acme" rouge and compositions manufactured by the George Zucker Company, of 202 Emmet street, Newark, N. J.

E. A. Fargo & Company, of Attleboro, Mass., makers of metal goods, have recently added a line of aluminum ice cream spoons to their list of metal goods. The spoons are finished both in French gray and bright polish.

The American Slate Company, of 131 State street, Boston,

Mass., report that since the reorganization of their company business has grown steadily. They manufacture everything in slate, particularly tanks for platers' use.

B. Muscat, formerly in charge of the business of the Syracuse Smelting Company, in the province of Ontario, has started the Canadian Metal Commission Company, 87 Jarvis street, Toronto. The company deals in metal scrap and refuse.

McKesson & Robbins, of 85-87 Fulton street, manufacturing chemists, are handling a special line of metallic bismuth, cadmium and cobalt. They say they can accommodate the consumer with low quotations on quicksilver, cyanide and nickel salts.

Charles W. Moore, 39 East Washington avenue, Bridgeport, Conn., has put in recently a set of alligator shears, built by M. Hoagland & Sons Company, which he finds very suitable for chopping up metals. Mr. Moore reports a brisk business.

Recording pyrometers for all ranges of temperature to 3000° F. and indicating pyrometers for molten metals just before pouring are the specialties of William H. Bristol, 45 Vesey street, New York City, manufacturer of pyrometers and electric furnaces.

A. Demandowski, who has a metal spinning shop at 352 Austin avenue, San Francisco, Cal., is in the market for sheet copper, brass, German silver, spinning lathe and plating supplies. Mr. Demandowski's entire plant was consumed by the fire.

Frank Wheeler & Son, of Meriden, Conn., have decided to build an addition to their present shop, which will be used for a storehouse. They will also have their own laboratory. The firm build power presses and manufacture special hardware.

Philip Broomfield & Company are now settled in their new plant on Midway street, off A street, Boston, Mass., where they have the facilities for sorting and grading all kinds of scrap metals. They make a specialty of selling to the foundry trade.

A. H. Hicks, late forman of the Phoenix Lock Works of Newark, N. J., and G. S. Earle have started the Cyko Brass Foundry at 68 New Jersey Railroad avenue, Newark, N. J., where they will do all kinds of brass and composition castings.

The Frankel Display Fixture Company, 27 Vestry street, New York City, have increased their floor capacity 50 per cent and are seeking 25 per cent more. The company make gas and electric and bar fixtures and at the present time are overrun with orders.

John C. Culbert, Pawtucket, R. I., announces that he is in the market for 500,000 pounds of old copper wire, 500,000 pounds of yellow and red brass washings and 30,000 pounds of scrap sheet aluminum. "Spot Cash" for this material will be paid by Mr. Culbert.

The Peckham Manufacturing Company, of 244 South street, Newark, N. J., manufacturers of meal for dry barrel polishing, have occupied a 4-story brick building adjoining their old location, and where they have ample capacity for the making of their product.

O. F. Mousette, manufacturer of tools, dies, presses and special machinery, at Driggs avenue and North Tenth street, Brooklyn, N. Y., has moved to the opposite corner of the same streets, where he has a location 40 by 150 feet, and much more ample accommodations.

M. C. Caufield & Son, smelters and refiners, of 93 Wilsey street, Newark, N. J., are preparing plans for the erection of a substantial building of cement blocks. This firm is now running at its full capacity and the intended enlargement will more than double their present output.

The Ames Sword Company, of Chicopee, Mass., who are famous all over the world for their swords, also manufacture endless sewed polishing belts. They have used these belts in their own shops and found them so satisfactory that they decided to manufacture them for the outside trade.

Our San Francisco correspondent writes that about all of the metal working shops of that city are more or less in need of metals, supplies and machinery and desire catalogs. He urges that manufacturers desiring to increase their sales should give attention to the needs of San Francisco and California.

The way that factories are at present growing in New England, some of them anyway, is shown by the growth of the North & Judd Manufacturing Company, of New Britain, Conn. Within three years the size of their plant has been doubled. They now employ 1,100 men engaged in the manufacture of saddlery hardware.

On May 1 the Clinton Wire Cloth Company, Clinton, Mass., will remove its New York office from 33 Park Place to 261 Broadway. At the same time the Chicago office will be removed from 237 Lake street to 30 and 32 River street. For over half a century this concern has been manufacturing wire cloth of every description.

Owing to the increase of their business, the Waterbury Crucible Company, of Waterbury, Conn., intend to buy property alongside the railroad track in Waterbury and next spring put up a new plant which is to be a model of its kind and which will give them four times the output of their present works, which are located in the center of the town.

Thomas Fawcett, manufacturer of saddlery, hardware and harness mountings, has moved his plant from 125 West Thirty-second street, New York City, to 407 West Thirty-sixth street, where he has much more convenient and spacious quarters. This change of quarters was made necessary by the improvements of the Pennsylvania Railroad.

An addition of 50 x 160 is being erected by the Herald Machine Company, of Worcester, Mass. It will be finished in four months and will give them four times their present floor space. The additional room will be used for building machine tools and for storing purposes. The company manufacture a line of special grinding tools.

The Eureka Pneumatic Spray Company have moved their offices to 92 Lafayette street, New York City. They report that they often have requests for air brush operators and spray machine operators on metal lacquering, bronzing, japanning, enameling, etc., and they can usually find employment for any one who can fill the requirements.

A thief who was captured recently while trying to get away with some copper wire at the Long Island Railway Yards, Long Island City, N. Y., was equal to the occasion by giving his name as Frederick Brass. Several of his pals escaped, but if caught they might have been thoughtful enough to have mustered in names of John Bronze and Jimmy Alloy.

The American Chasing & Molding Company, recently established at 145 East Twenty-third street, New York City, are turning out a high class of molds for clocks, novelties and all soft metals. This firm also makes patterns for chandeliers, chasing of molds, etc. G. Kelch, proprietor of the new concern, has had an experience covering 30 years in the making of molds.

The Willson Aluminum Company, 97 Cedar street, New York, announce that their works at Kanawha Falls, W. Va., have been sold and transferred to the Electro Metallurgical Company, with general offices at 157 Michigan avenue, Chicago, Ill., and a New York office at 79 Wall street. The sale includes business, good will and patents. The company manufacture ferro-alloys.

The Muzzy-Lyon Company, Ltd., of Detroit, Mich., are now located in their new plant where they are manufacturing a general line of babbitt metal in addition to their "Mogul" and "Duro" brands which are sold in every State. These brands will be maintained as the principal business but they will, as

stated, manufacture all other grades of babbitt metal as well as solder.

The United States Chemical Company, who have been manufacturers of polishers' and platers' supplies for the past ten years, with office at 10 Wade Building, Cleveland, Ohio, have now under construction a new one-story factory addition, 40 x 100 feet, to which they expect to add two stories next year. The company report that they make their complete line, excepting wheels and anodes.

The Domestic Plating Works, of 34-36 West Washington street, Chicago, will move before May 1st to their new building, which is just about finished, at May and Washington streets. This will be one of the largest job plating plants in the country. The building is composed of four floors, each 50 x 100 feet. This firm does all kinds of plating, polishing, buffing, lacquering and oxidizing.

By putting in one hundred new machine tools George G. Prentice & Company, of New Haven, Conn., hope to catch up with the orders for their new automatic turret lathe. The new machinery includes lathes, drill presses and general machine shop tools made by Jones & Lamson Machine Company, Springfield, Vt., the Warner & Swasey Company, Cleveland, Ohio, and the Hendey Machine Company, Torrington, Conn.

Harry F. Stahler, formerly of Boston, a plater of 20 years' experience, has bought the plating plant known as the Lyndonville Electro-plating Works at Lyndonville, Vt. This company does the plating for several of the largest metal manufacturing concerns in Vermont, as well as a general line of jobbing. The plant is well equipped with modern machinery and the work of the company has an excellent reputation in New England.

The Standard Brass Company, of Utica, N. Y., manufacturers of gas and electric fixtures, plumbers' supplies and bed trimmings, and also doing a large plating business, were burned to the ground February 28. They have secured another large building where they have more room and better facilities for their increasing business. Under the new management of A. L. Stocking they are putting in an up-to-date plant all the way through.

The Sweet & Doyle Valve Company, of Troy, N. Y., have completed the erection of a plant for general jobbing and machinery work, and have started with a goodly force of mechanics. The company have secured the contract for all the metal work to be used on the several dams and locks that are being erected by the Pittsburg Eastern Construction Company, who have the contract for the new barge canal in the vicinity of Scotia, known as section two.

Charles Clifford & Son, Limited, of Birmingham, England, have taken a card in THE METAL INDUSTRY Directory of METAL ROLLING MILLS and in which they announce that they are contractors to the Admiralty, War Office and most of the principal railway companies of Great Britain. They manufacture brass and copper tubes both brazed and seamless, also sell pure aluminum and aluminum bronze, phosphor bronze and manganese bronze in sheets, rods, tubes and wire.

Horace Richardson has been elected Treasurer of the Taunton Crucible Company, Taunton, Mass., succeeding E. D. Paige, who has severed his connection with the company. Mr. Richardson will have the general management of the company's affairs. The company are now operating the recent addition to their works, which has doubled their output and they are well equipped to take care of any business which comes their way. The addition to their plant included a new office.

In our Directory of METAL ROLLING MILLS the Scovill Manufacturing Company, of Waterbury, Conn., announce that they are the largest and most fully equipped brass rolling mills and metal goods manufacturing establishment in the world. The company also furnish estimates for specialties in brass, German silver and aluminum. They were established in 1802 and have branch stores at New York, Boston and Chicago.

Denniston's San Francisco Plating Works, of San Francisco, Cal., have resumed business at 1349 and 1351 Mission street, between Ninth and Tenth streets. Their new plating works are large and complete, containing every modern improvement. They are now in full operation, and with increased facilities can furnish silver-plated copper mining plates promptly and at reasonable rates. They also re-plate old mining plates, making them equal to new. They purchase old plates, and take them in exchange for new, also separate the gold, silver and copper in them at low cost.

The Crescent Brass Manufacturing Company, of Reading, Pa., are now very busy, and in some departments are compelled to work overtime. They are at present at work on one of the largest orders ever received. It is from the United States Government and calls for 25,000 castings, the exact nature of which is not disclosed. This order will keep them running for a considerable time. The company are also very busy making automobile castings for which there is a heavy demand. Their cast chandelier department is also active. Although the company has been established only three years their brass, bronze and aluminum castings are in much demand.

Within the last two months the Bridgeport Crucible Company, Bridgeport, Conn., have doubled the capacity of their Bridgeport plant and in a short time will be in a position to double their output. They have moved into a new office at the corner of East Washington avenue and Knowlton street, where they have bought property 150 x 125 and have put up two kilns and a packing and supply room. The old office, which was located in their factory across the street from their new quarters, is used as part of their shop. The Bridgeport Crucible Company also control the Taunton Crucible Company, of Taunton, Mass., and business there has grown to such an extent that the Taunton works will have to be enlarged.

On May 1 the firm of Rahn & Germann, makers of brass, bronze and copper castings, cold pressed copper commutator bars, babbitt metal and solders, will be dissolved by mutual consent, and the business will be taken over by the Germann Bronze Company, Erie, Pa. The incorporators of the new company are John G. Germann, president; Bert C. Edkin, vice-president, and Lewis T. Briggs, secretary and treasurer. Mr. Germann, who has been identified with the business as a partner, will be manager of the new concern. Mr. Edkin, who for the past 14 years has been foreman of the foundry at the Metric Metal Works, will have charge of the foundry, and Mr. Briggs, formerly with the Ball Engine Company, will look after the office. The company are now erecting a foundry which they will occupy as soon as completed.

FIRES.

The brass foundry of the J. G. Brill Company, of Philadelphia, Pa., was damaged by fire recently.

As we go to press a Chicago (Ill.) dispatch states that fire destroyed the six-story building at the southwest corner of Madison and Market streets, in which was located the Superior Brass Fixture Works.

The Star Refining Company, whose office is at 50 State street, Boston, Mass., and plant at South Boston, report that they have recovered from the fire and are now turning out ingot metals the same as formerly.

MEETINGS

At a recent special meeting of the stockholders of Landers, Frary & Clark, New Britain, Conn., the recommendation of the Board of Directors to increase the capital stock of the corporation from $1,000,000 to $1,250,000 was approved. The company is engaged in extensive enlargements.

At a recent meeting of the Poole Silver Company, Taunton, Mass., the following officers were elected: President and Treasurer, Willard W. Lemaire; Secretary and Clerk, M. L. Poole; Superintendent, H. L. Massey. The election of new officers was necessary through the death of some members of the firm. The new management will continue to manufacture silver plated hollow ware the same as before.

FINANCIAL

THE PILLING BRASS COMPANY, a new rolling mill of Waterbury, Conn., is now organized with a capital stock of $25,000 and is turning out sheet metal. The directors are J. W. Pilling, J. L. Sweiger and J. H. Pilling. Officers: President and Treasurer, J. W. Pilling; Secretary, J. L. Sweiger.

INCORPORATIONS.

The Aluminum Foundry Corporation, of Southport, Conn., has filed a certificate of increase of capital stock from $10,000 to $25,000.

The Seattle Wire & Plating Works, of Seattle, Wash., have been incorporated with a capital of $50,000 by Paul C. Brueggemann and Herman Knausenberger.

The Paterson Brass Foundry, of Paterson, N. J., has been incorporated, with a capital of $25,000, by Orloff O. Dixon, Percy O. Dixon and Edward J. Banker.

The Frank H. Graf Manufacturing Company, of New York City, has been incorporated, with a capital of $25,000, for manufacturing brass and wrought iron work. The incorporators are F. H. Graf, C. L. Graf and H. G. Graf, all of New York City.

The Irving Iron Works Company, New York City, has been incorporated, with a capital of $50,000, to manufacture steel, iron, brass, etc., for buildings, by W. E. Irving, of Glenbrook, Conn.; G. A. Keller, New York City, and W. V. Willson, of Flushing, N. Y.

The Knowlson & Kelly Company, of Troy, N. Y., has been chartered to manufacture engine and machine shop and factory supplies. The capital stock is $74,000; the directors are as follows: John Knowlson, James Kelly, W. O. Knowlson and J. R. Knowlson, all of Troy.

The Canton Brass Company, of Canton, O., has been incorporated by Gordon M. Mather, C. A. Dougherty, J. J. McMahon, C. W. Keplinger and H. S. Renkert, with a capital of $20,000. It is stated that the company will conduct its business at the Aultman plant with Frank C. McLain as manager.

The White Metal Company, of Jersey City, N. J., has been incorporated, with a capital of $30,000, to manufacture iron, steel and copper articles. The incorporators are Joseph Casiraght and Jean Leblanc, of 59 Seventh street, Guttenberg, N. J., and Henry C. Cryden, of 583 Park avenue, New York City.

The certificate of incorporation of the Connecticut Metal Company, of Bridgeport, Conn., has been filed with the Secretary of State. It is stated that the new company will be capitalized at $50,000 and will engage in the manufacture of small parts, especially brass castings. The incorporators are Henry A. Bishop, William E. Bernham and Judge Alfred B. Beers.

A charter has been granted by Pennsylvania to the Reading Standard Company, of Reading, Pa. The concern is capitalized at $300,000 and will manufacture metal castings, bicycles, tricycles and motor propelling machines. The company have a plating room and machine shop, but at present no foundry. The officers are Daniel F. Printz, of Reading, president; D. P. Harris, of New York, vice president; Harry Walburg, secretary; Wm. F. Remppis, treasurer.

PRINTED MATTER

BLOTTERS. Hazard, Coates & Bennett Company, smelters, refiners and dealers in metal, of Rochester, N. Y., are issuing very attractive blotters on the smooth side of which are sea and landscapes, and calendar for the month and the announcement of the company.

GENERATING SETS AND HORIZONTAL ENGINES.—A neat pamphlet issued by the B. F. Sturtevant Company, of Hyde Park, Mass., describes their generating sets and horizontal engines. These generators are of the 8-pole type direct connected to the engines by flange couplings. The engines are made in sizes from 8 x 8 to 16 x 18, and the generators run from 20 to 150 k. w.

FOUNDRY SUPPLIES.—A neat and catchy blotter has been prepared by the Springfield Facing Company, of Springfield, Mass. Under half-tones of an attractive young lady are the following titles: Shall we write to you? Or will you call? Or would you prefer us to call? Must we beg for it? Or will you throw it our way? Or must we go after it with an axe? In each photo the lady, of course, assumes an appropriate position.

BRASS FOUNDRY EQUIPMENT AND SUPPLIES. A very extensive catalogue has been prepared by J. W. Paxson & Company, of Philadelphia, Pa., describing their full line of brass foundry equipment and supplies. This company have had an experience of over 40 years in the foundry supply business and now claim to be the first house in America that absolutely builds, manufactures and produces almost all of the necessary equipment for iron, steel and brass foundries of any capacity. This wide line can best be appreciated by an examination of the catalogue.

PROCESS OF BURNING FUEL OIL.—In a pamphlet issued by the Gilbert & Baker Manufacturing Company, of Springfield, Mass., the Springfield process for burning fuel oil under low pressure is described. It is stated that this system has been thoroughly tried and has been found to be particularly advantageous for forging, annealing, crucible melting, tempering, welding, enameling and similar work. Economy is assured, as the fuel is applied directly to the purpose in view. The heat is easily regulated and steadily maintained, the operation being, in fact, largely automatic. This system has been in successful operation in many of the largest manufacturing concerns in the country.

ALUMINUM SOLDER.—We have received from J. H. Jolley & Co., of 42 North Fifth street, Philadelphia, Pa., a circular describing Thwing's aluminum solder for joining aluminum to aluminum, or to brass, copper, iron or any other metal which can be tinned. It melts easily, like ordinary half and half, and can be worked with the flame or with a common soldering iron. It is claimed to stand the weather as well as aluminum, thereby making it a perfect solder for electric conductors. It is not necessary to use an acid or flux as it is all in the solder. The joints are first cleaned and tinned; then the aluminum is heated until it melts the solder, which is rubbed on the surface to remove the oxide. The surfaces thus tinned are then sweated together, or joined with the soldering iron.

PORTABLE CORE OVENS.—Harman & Derichs, of Holyoke, Mass., have placed on the market a portable core oven all complete and ready to put the fire in. The cores are placed on a set of swinging shelves, which operate independently of each other, so that it is possible at any time to remove the cores on a single shelf without lowering the temperature of the oven or hindering in any way the baking process going on on the other shelves. In swinging a shelf outward, the rear door closes the opening, thereby retaining the heat in the oven, the result being a saving in the fuel. The front is of cast and wrought iron. The sides, back and top are of double galvanized iron, with a one-inch air space between. Four of the doors are 5 inches high and one 10 inches high, but these dimensions can be varied as may be desired. The oven occupies a floor space of 40 inches, and is 60 inches in height. The fire box has an area of 130 square inches, and the entire weight of the oven is 800 pounds.

POLISHING AND BUFFING MACHINERY AND SUPPLIES. ELECTRO-PLATING OUTFITS. A very elaborate catalogue has been prepared

by Cutter, Wood & Stevens Company, Boston, Mass., dealing with their polishing and buffing machinery, abrasives, electro-plating outfits, and all the necessary apparatus for the polishing and finishing of metals. The introduction very truly states that in order to obtain the best results in polishing and plating at a minimum cost, it is essential that all working conditions be carefully arranged; and then follow suggestions of a practical nature which can be read and studied to advantage by all those having or contemplating the installation of plating plants. The demand for an efficient dynamo machine capable of producing large quantities of current for use in electro-plating, electrotyping, electrolytic reduction of ores, synthesis of chemical compounds, etc., has resulted in the perfection of the low potential dynamo generator. In this the chief characteristics are low voltage and large quantity of current. These machines and the general layout of plating rooms for different requirements are clearly set forth in the catalogue.

CATALOGUE BUREAU

THE METAL INDUSTRY has established a Catalogue Bureau by which it will prepare and do all the work necessary for the making of catalogues, pamphlets, circulars and other printed matter. Estimates will be furnished for writing the description, making engravings, printing, binding, in fact for the entire job from the beginning to the end or any part of it. Let us know your needs and we will tell you just exactly what we can do and what it will cost you. A catalogue should be a trade getter—that is the kind we produce. Write to the CATALOGUE BUREAU of THE METAL INDUSTRY, 61 Beekman street, New York.

OFFICE HEADQUARTERS

When visiting New York, the out-of-town friends of THE METAL INDUSTRY are invited to make our office their headquarters, where a writing desk and telephone service will be at their disposal. Every one interested in the non-ferrous metals and alloys is invited to call.

INFORMATION BUREAU

Subscribers intending to purchase metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY. Our information Bureau is for the purpose of answering questions of all kinds. Send for circular.

METAL MARKET REVIEW

NEW YORK, April 8, 1907.

COPPER.—Standard copper in London opened at £109 10s. and advanced to £110 10s., and, with the slump in the stock markets, prices broke rapidly, the lowest point reached being £95; later, prices reacted and closed at £97 5s., making a net decline for the month of £12 per ton. The general outlook for the metal is not so strong and the premium on futures has been cut down to less than 10s. per ton, which, a few weeks back, were bringing £2 per ton over spots.

The New York market has suffered from the crash in Wall street and the copper market at present writing is very irregular, with prices quoted being entirely nominal. The exports for the month were 13,000 tons, against 22,000 tons last year. The foreign statistics, as at present compiled, are not altogether reliable and show an increase in the visible supply for the month of about 2,000 tons. There is very little new business reported, the leading interest is reported to have made a large sale at 26 cents per pound, the United Metals Selling Company quoted Lake at 25½ cents and Electrolytic at 25¼, and there is no necessity to lower these figures until the larger consumers are ready to contract for the summer months and whether that price will be 25 cents or 24 cents is guesswork. With the London copper market down to £97 consumers here are in better shape to dictate terms to producers than they have been in several months, and it is only natural to suppose they will hold off as long as possible. Prices to-day are nominal: Lake, 25 to 25¼ cents; Electrolytic, 24½ to 25 cents, and casting brands, 23 to 24 cents, and it is quite possible there may be speculative short sellers at considerably lower than these figures.

TIN.—London spot tin opened at £192, advanced to £192 10c., broke to £181 10s. during the general crash, and closed at £189, showing a net decline for the month of £3 per ton.

In the New York market prices have fluctuated irregularly following the London cables. The statistics for the month are rather bearish, showing an increase in the visible supply of a year ago of about 1,300 tons in face of very heavy deliveries; total deliveries for the month were 6,157 tons, the consumption for America is placed at 3,900 tons. The market prices to-day are 5-10 ton lots spot 40.60, May delivery 40.25, smaller lots 10 to 15 points higher.

LEAD.—The London market has held very steady at around £19 12s. 6d.

The New York market has ruled strong, with the trust price 6 cents, New York basis; carload lots spot New York have been worth 6.25, smaller lots 6½ cents from store.

SPELTER.—Price in London has fluctuated between £26 10s. and £25 15s. closed at £25 15s.

The New York market has ruled very strong, with St. Louis prices up to 6.90 for spot spelter and very scarce at that, the New York price has been close to 7 cents for prompt carload lots. At the close the market is easier and prices are down about 20 points from the highest. St. Louis to-day is down to 6.65-6.70 for April delivery, and May and June options 5 to 10 points lower.

ALUMINUM.—Market holds very strong and prices are nominal at from 48 cents to 50 cents, according to quality and time of delivery.

ANTIMONY.—London prices have declined about £3 per ton during the month. In New York the market has ruled more or less weak and unsettled and prices are about 1 cent to 1½ cents per pound lower. Cookson's to-day 24.00 cents, Halletts 21 to 21¼ and Hungarian grade 20½ to 21 cents.

SILVER.—The London price of silver has declined considerably, opening at 32⅛d. the market closed at 30½d. and in New York opening at 69¼ cents and closed at 65¾ cents. One of the reasons given being that China paid part of her debts in the white metal.

PLATINUM.—This metal, which has been steadily going up during the past few months until it reached $38 per ounce, has declined to $34. There is a general impression that there is a likelihood of a still further decline.

SHEET METALS.—There has been no change in the price of sheet copper or brass, the base price of copper steady at 32 cents. Sheet aluminum is sold at a premium above list prices. The mills are all busy and report good business ahead.

OLD METALS.—The old metal market has had its crash with Wall street; the declines in copper scrap have been very violent and prices were very irregular. The market to-day is more or less nominal, heavy copper and copper wire is quoted at 19.50 to 20.00 against 22.00 to 22.50 a month ago. The old metal trade did not wait for copper to decline, but just let their scrap go quick at best possible prices. Zinc dross is a shade easier at 5.40 New York.

See Advertising Page 23 following for Trade Wants

Metal Prices, April 15, 1907

METALS.	Price per lb.
COPPER, PIG, BAR AND INGOT AND OLD COPPER.	
Duty Free. Manufactured 2½c. per lb.	
Lake, car load lots	25.00
Electrolytic, car load lots	24.50
Casting, car load lots	23.00
TIN—Duty Free.	
Straits of Malacca, car load lots	40.60
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig lead, car load lots	6.25
SPELTER—Duty 1½c. per lb.	
Western, car load lots	6.90
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots .....Nominal	50.00
100 lb. lots..... "	49.00
Ton lots ..... "	48.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons, cask lots	24.00
Hallets, cask lots	21.25
Other, cask lots	21.00
NICKEL—Duty 6c. per lb.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.50 to .60
MANGANESE—Duty 20%	.80
MAGNESIUM—Duty Free	$1.50 to $1.60
BISMUTH—Duty Free	1.50 to 1.55
CADMIUM—Duty Free	1.55 to 1.60
	Price per oz.
GOLD—Duty Free	$20.67
SILVER—Duty Free	.65⅝
PLATINUM—Duty Free	34.00
QUICKSILVER—Duty 7c. per lb. Price per flask	41.00

OLD METALS.	Price per lb.	
Heavy Cut Copper	19.50	20.50
Copper Wire	19.00	20.00
Light Copper	17.50	18.50
Heavy Mach. Comp	17.50	18.50
Heavy Brass	14.00	15.00
Light Brass	11.50	12.00
No. 1 Yellow Brass Turnings	13.00	14.00
No. 1 Comp. Turnings	16.00	17.00
Heavy Lead	5.50	6.00
Zinc Scrap	5.00	5.00
Scrap Aluminum, sheet, pure	30.00	32.00
Scrap Aluminum, cast, alloyed	25.00	27.00
Scrap Aluminum, turnings	10.00	13.00
Old Nickel, solid	18.00	25.00
No. 1 Pewter	31.00	32.00

	Price per lb.
SILICON COPPER, according to quantity	.37 to .39
PHOSPHOR COPPER, 5%	.25 to .27
Phosphor Tin	.47 to .48
Brass Ingot, Yellow	.15 to .17
Brass Ingot, Red	.18 to .21
Bronze Ingot	.17 to .20
Manganese Bronze	.20 to .22
Phosphor Bronze	.22 to .25

ZINC—Duty, sheet, 2c. per lb.	Price per lb.
600 lb. casks	8.90
Open casks	9.40

PHOSPHORUS—Duty 18c. per lb.	
According to quantity	.35 to .50

PRICES OF SHEET COPPER.

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb. sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	32	32	32	32	32	33
	Longer than 72 ins. Not longer than 96 ins.	32	32	32	32	32	33
	Longer than 96 ins.	32	32	32	32	32	34
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	32	32	32	32	32	34
	Longer than 72 ins. Not longer than 96 ins.	32	32	32	32	32	34
	Longer than 96 ins. Not longer than 120 ins.	32	32	32	32	33	35
	Longer than 120 ins.	32	32	32	33	34	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	32	32	32	33	34	36
	Longer than 72 ins. Not longer than 96 ins.	32	32	32	33	35	37
	Longer than 96 ins. Not longer than 120 ins.	32	32	32	34	36	40
	Longer than 120 ins.	32	32	33	35	38	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	32	32	32	33	35	38
	Longer than 72 ins. Not longer than 96 ins.	32	32	32	34	36	41
	Longer than 96 ins. Not longer than 120 ins.	32	32	33	35	38	
	Longer than 120 ins.	33	33	34	36	40	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	32	32	33	35	40	
	Longer than 96 ins. Not longer than 120 ins.	32	32	34	37	42	
	Longer than 120 ins.	33	33	35	40		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	33	33	35	38		
	Longer than 96 ins. Not longer than 120 ins.	34	34	36	39		
	Longer than 120 ins.	35	35	37	41		
Wider than 108 ins.	Not longer than 132 ins.	36	36	38			
	Longer than 132 ins.	37	37	40			

Rolled Round Copper, ⅝ inch diameter or over, 32 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 3½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, April 15, 1907

Net Cash Prices.

COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot, and heavier, per lb.	36c.
12 oz. and up to 14 oz. to square foot, per lb.	37c.
10 oz. and up to 12 oz.	39c.
Lighter than 10 oz.	42c.

Circles less than 8 in. dia., 2c. per lb. additional.
Circles over 13 in. dia. are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICES ON BRASS MATERIAL.

In Effect January 21, 1907.

To customers who purchase less than 5,000 pounds per month and over 5,000 pounds per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.22⅝	$0.26	$0.28⅛
Wire ¼" and larger	.23	.26¼	.28½
Wire smaller than ¼" to No. 8, inclusive	.23⅜	.27	.29¼
Wire smaller than No. 8 to No. 10, inclusive	.24¼	.27½	.29⅝
Rods smaller than ½" diameter	.23¼	.26½	.29⅝
Rods ½" to 1" diameter, inclusive	.23	.26¼	.29½
Brazed brass tubing	.29⅛	—	—
Brazed Bronze and Copper Tubing	—	—	.33¼
Open Seam Brass Tubing	.27⅛	—	—
Open Seam Bronze Tubing	—	—	.31⅛
Brass Moulding	.29⅛	—	—
Bronze Moulding	—	—	.33⅝

15% discount from all extras.

To customers who purchase less than 5,000 pounds per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.23⅛	$0.27	$0.29¼
Wire ¼" and larger	.24	.27½	.29½
Wire smaller than ¼" to No. 8, inclusive	.24⅜	.28	.30¼
Wire smaller than No. 8 to No. 10, inclusive	.25¼	.28½	.30⅝
Rods smaller than ½" diameter	.24¼	.27½	.30⅝
Rods ½" to 1" diameter, inclusive	.24	.27¼	.30½
Brazed brass tubing	.30⅛	—	—
Brazed bronze and copper tubing	—	—	.34¼
Open seam brass tubing	.28⅛	—	—
Open seam bronze tubing	—	—	.32½
Brass moulding	.30⅛	—	—
Bronze moulding	—	—	.34⅝

5% discount from all extras.

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 8½ in. O. D. Nos. 4 to 13 Stubs Gauge, 27c. per lb.
Seamless Copper Tubing, 32c. per. lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size.	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	35	34	29	28	27	27	27	27	27	27	27	28	29	31	33	34

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 Feet. Brass.	Bronze.
⅝ inch	$8.00	$9.00
½ inch	8.00	9.00
⅝ inch	10.00	11.00
¾ inch	12.00	13.00
⅞ inch	14.00	15.00
1 inch	18.00	20.00
1¼ inch	22.00	24.00
1½ inch	25.00	27.00
1¾ inch	32.00	35.00
1⅞ inch	45.00	48.00
2 inch	56.00	60.00

Discount 30 per cent.

GERMAN SILVER TUBING.

4	per cent.	to No.	19,	B. & S.	Gauge,	inclusive	$0.60
6	"	"	19,	"	"	"	.70
9	"	"	19,	"	"	"	.85
12	"	"	19,	"	"	"	1.00
15	"	"	19,	"	"	"	1.15
16	"	"	19,	"	"	"	1.20
18	"	"	19,	"	"	"	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 10 per cent.

Prices on Sheet Block Tin and Britannia Metal.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 4c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

Wider than and .. including ..	*3in. 12in. in coils.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.	Polishing or Cutting to Length.	Satin Finishing one Side.
No. 13 and heavier	47	47	49	49	49	49	52	52	52	1	2
" 14	47	47	49	49	49	49	52	52	52	1	2
" 15	47	47	49	49	49	49	52	52	52	1	2
" 16	47	47	49	49	49	49	52	52	52	1	2
" 17	47	47	49	49	49	49	52	52	52	1	3
" 18	47	47	49	49	49	49	52	52	55	1	3
" 19	47	47	49	49	49	49	52	53	56	1	4
" 20	47	49	49	49	49	51	54	55	57	1	4
" 21	47	51	51	51	51	53	56	57	63	2	5
" 22	47	51	51	51	53	53	56	60	64	2	5
" 23	47	51	51	51	53	53	56	62	65	2	6
" 24	47	51	53	55	55	55	58	64	67	2	6
" 25	49	52	54	56	56	56	59	66	70	2	7
" 26	49	52	55	59	59	59	64	68	74	2	8
" 27	49	53	57	61	61	62	67	71	77	2	10
" 28	49	53	59	61	62	62	69	75	80	2	11
" 29	51	54	61	63	65	65	74	80	85	2	13
" 30	51	55	63	65	69	75	82	85	90	2	15
" 31	56	60	68	71	76	84	87	90	96	3	17
" 32	58	62	70	74	82	90	97	103	108	3	19
" 33	60	64	73	78	86	97	104	113	123	3	21
" 34	63	68	75	83	91	104	116	123	133	3	25
" 35	..	78	83	93	103	113	128	138	..	..	..
" 36	..	93	103	113	128	133	148	..	..	..	..
" 37	..	117	121	142	157	172	187	..	..	..	..
" 38	..	137	152	167	182	197	217	..	..	..	..
" 39	..	157	177	197	217	237	..	..	..	..	..
" 40	..	187	217	237	257	..	..	..	..	..	..

*Polished or scratch brushed 2 sides, double above prices.

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICES LIST OF SEAMLESS ALUMINUM TUBING—STUBS' GAUGE.

Stubs' G.	¼"	⅜"	½"	⅝"	¾"	1"	1½"	2"	2½"	2¾"
4 to 11	..	..	96	86	83	77	67	61	61	61
12	..	1.08	96	86	85	77	67	61	61	61
13	..	1.08	96	86	83	77	67	64	64	64
14	..	1.08	96	86	83	77	67	64	64	64
15	..	1.12	96	89	86	80	70	67	67	67
16	..	1.15	99	93	89	83	70	70	70	70
17	..	1.18	1.02	96	93	86	73	73	73	73
18	1.85	1.24	1.05	99	93	86	77	77	77	80
19	1.88	1.28	1.08	1.02	99	93	83	80	80	83
20	1.95	1.31	1.15	1.08	1.05	99	89	86	86	89
21	2.01	1.37	1.21	1.15	1.12	1.05	99	93	93	96
22	2.17	1.44	1.24	1.18	1.15	1.08	1.05	99	1.05	1.05
23	2.33	1.50	1.31	1.24	1.21	1.15	1.15	1.08	1.15	1.15
24	2.48	1.60	1.37	1.31	1.28	1.18	1.21	1.21	1.24	..
25	2.65	1.69	1.47	1.37	1.34	1.28	1.34	..	..	..

Prices are for lots of 50 lbs. Boxing extra. Smaller, larger and intermediate sizes furnished by manufacturers.

PRICE LIST FOR ALUMINUM ROD AND WIRE—B. & S. GAUGE.

Diameter B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb.	43	43½	43½	44	44½	45	45½	46	47	48	49	52	57

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 30 per cent.

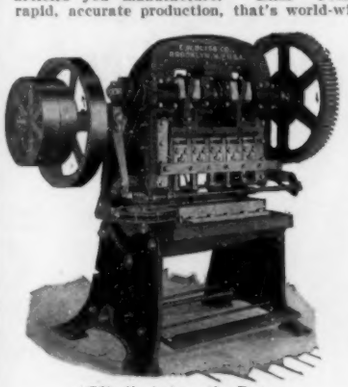
Munts or Yellow Metal Sheathing (14" x 48")	22c. lb. net base.
" " " Rectangular Sheets other than Sheathing	24c. " " "
" " " Rod	23c. " " "
Tobin Bronze Rod	25c. " " "

Above are for 100 lbs. or more in one order.

PRICE OF SHEET SILVER—Rolled sterling silver .925 fine. For gauges below 32 B. & S., 2 cents below price of bullion. Above 32 B. & S. gauge from 2 to 4 cents above the price of bullion. Rolled silver anodes .999 fine. 2 cents above the price of bullion.

"BLISS"

can undoubtedly help you to cut down the cost of producing the articles you manufacture. "Bliss" Presses have a reputation for rapid, accurate production, that's world-wide.



"Bliss" Automatic Press.

For the rapid and economical production of articles which require a series of operations to be performed, such as burner parts, electric lamp sockets, etc. Made with five or more Punch Slides. Weight, as shown, 5,700 lbs.

"Bliss" Dial Press.

For the second, third or fourth operation on articles previously cut and partly formed. Two or three operations can often be performed simultaneously at each stroke of the press. Particulars on application.

"Presses for Every Purpose."

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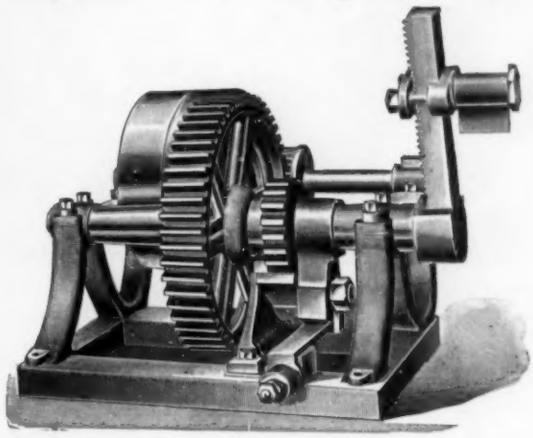
The PECK

Automatic Drop Lifter



Can be readily applied to any drop, and while it increases your output, decreases your pay roll.

We manufacture DROP PRESSES for all purposes and are Specialists in that line.

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- Power Presses, Single and Double Action Cam or Crank.
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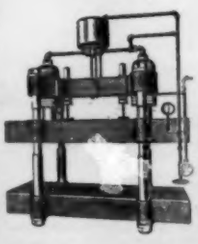

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For Index of Advertisements See Pages 34-35

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admits of a perfect adjustment in the degree of action on the barrel's contents—this is regulated by the hand-wheel at the side. Sheet-metal stampings and small castings are operated upon without injury. The tumbling parts can be seen, samples removed and replaced, while the machine is running. The barrel can be dumped into a small receptacle in one operation; the old kind involves two—scattering the tumbled parts over the floor, and picking them up. It occupies small floor-space—which is money these days. You can sweep around it easily, for it's a one-legged machine. New booklet for the asking.

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L. H. GILMER & CO.
PHILADELPHIA

Dumping Position.

Operation of BAIRD TILTING TUMBLERS is VISIBLE, not BLIND

Two size machines, No. 1 and No. 2, will take Barrels of all kinds up to 36 in. diameter.

New Catalogue "C" tells all.

BAIRD TUMBLERS

are quick and easy to operate, built STRONG to withstand rough usage and will run in either position shown in cuts or at any intermediate elevation.

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PATENTED SEPT. 16, 1902.

For cleanliness, perfect work and rapidity of action it is without an equal. A trial will cost nothing.

References from leading Jewelers and Brass Finishers will be furnished upon request.

Correspondence solicited, and all information cheerfully furnished. For full particulars and price address

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SIMPLE, EFFECTIVE, ECONOMICAL.

NEW FEATURES—Let us tell you about them.

RESULTS—Let us show you samples of work done.

IMPROVED HIGH PRESSURE BLOWER

NOISELESS. INEXPENSIVE.

Delivers Greater Volume at Higher Pressure Than Any Other Made.

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The accompanying cut illustrates a new model Weston Voltmeter expressly designed to meet the requirements of Electroplaters, Electrotypers and others engaged in the art of Electrometallurgy. It is accurate and thoroughly reliable. It is built in a thoroughly substantial manner; the workmanship is high grade. It is provided with a 15 point switch so that the difference of potential can be determined at any one of 15 tanks or all of them successively.

It is Low Priced and Good.

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FOR TWELVE YEARS

we have been manufacturing a high-grade Acid-Proof Vitrified Non-Absorbent Brick suitable for Acid Tanks, Plating Room flooring, etc., etc.

These brick immersed in a 50% Sulphuric Acid solution for several months show no signs of deterioration.

We also have the same material pulverized to mix with Portland Cement in place of Sand in laying the Brick.

INQUIRIES SOLICITED.

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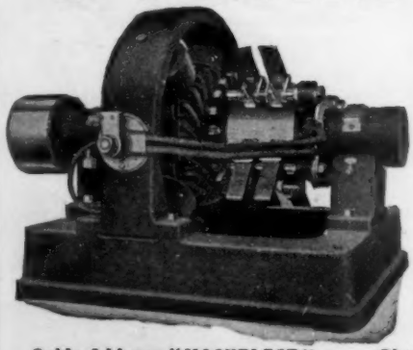

For Electro-Plating, Galvanizing and all other low voltage work.

50-8000 Amperes, 3-30 Volts.
Shunt, compound and separately excited.

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For a liberal compensation I will teach my process to manufacturers and fit up plants.

I make a specialty of etching plates in steel, copper, brass and zinc for transferring and embossing. Also silverware, including such articles as mirror, brush and comb backs, book and album covers, trays, souvenir spoons and similar articles.

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BRIDGEPORT, CONN., U. S. A.

Our New Patent Revolving Plating Apparatus for Automatic Plating in Nickel, Copper, Zinc, Brass or Bronze Solutions

Apparatus Ready to Receive or Discharge Work.

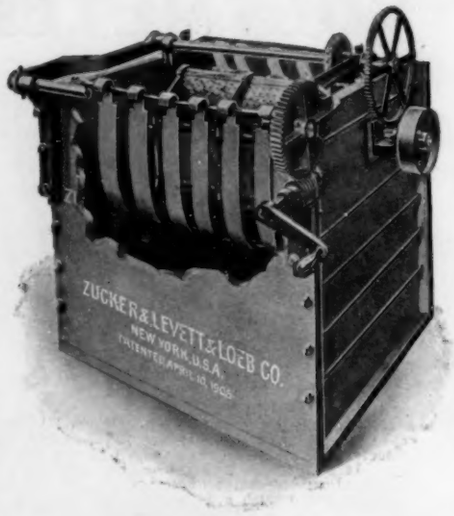
This apparatus consists of a wooden tank 32 x 32 x 36 with a revolving wooden hexagonal cylinder.

The rotation of the cylinder polishes the work and it comes out bright and does not require buffing. A feature of the apparatus is the crank and gear by which the cylinder is readily raised and lowered in the solution.

The apparatus is sold with or without solution or anodes, Solution required, 120 gallons.

We manufacture curved anodes with cast hook to insure good working. 12 are used in each tank.

For further particulars and net prices apply to



Apparatus in Working Position.

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Patent Separator

V. & L. Patent Separator, Hood and Metal Saving Device

HUNDREDS OF THEM IN USE
WHY NOT BE UP-TO-DATE?

This Separator is constructed to separate the line and dust from the air. Also can be placed next to the fan and collects material in bottom.

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Patent Hood and Metal Saving Device

Save Money

The hood and metal saving device for polishing or grinding wheels can be attached easily to machine and saves from 5 to 20 lbs. of metal per day.

PLATERS! METAL WORKERS!

¶ Invest $5 in this Inclinator and save Hundreds of Dollars in Acid Spills. Put on or taken off in a jiffy.

One Does for All Your Carboys — Sent on Approval

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Applied to any bright metal surface will prevent Tarnish and Corrosion.

Use on Engines, Machinery, Guns, Tools, or Plated Ware, or Goods for Exhibition.

Successfully used on Automobiles, Bicycles or Carriages, both on the metal or varnished parts.

Invisible, waterproof, easily applied.

Dealers, or large sample by mail for 30 cents.

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Are the only ones that have always been of a good uniform quality. We SAVE you trade, worry and money

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There are no better Lacquers. Some of our customers say there are none so good. Let us know whether you brush or dip your goods and what colors you use. We will pick out what you want and send a free working sample.

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CLEANS and POLISHES
All Silverware, Brass, Copper, Gold, Nickel, Zinc, Tin and Enamelware, Glassware, Gas Fixtures, Marblework, Floors, Woodwork, Tile, Onyx, Wall Decorations, etc. :: Non-inflamable

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A HANDFUL OF PIG'S HAIR TIED TO A STICK

to apply your Paint, Japan, Enamel, Lacquer, Bronze, Etc., to your work?

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uses our SPRAYERS or AIR BRUSHES, and does better work in half the time. Other trades have progressed, why stick to the brush of the stone age? BETTER WORK AT LESS COST, IF YOU DO IT OUR WAY.

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Cost of Silver Plating Reduced 50 to 75 Per Cent

With better work and work that will not tarnish as rapidly as that plated by the process of plating with pure silver is the verdict of users of R. H. Marshall solution of silver and nickel, Patented April 23, 1907, other patents pending.

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¶SAMPLES OF WORK BY THIS PROCESS SENT UPON REQUEST.

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DAILY METAL PRICES.

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copy sent for the asking.

ANALYZING AND TESTING BUREAU.

THE METAL INDUSTRY is independent of all laboratories, but we offer our services in directing our readers where they can get metals, materials and supplies analyzed and tested to the best advantage. We have an intimate knowledge of the best laboratories in the country and know the specialties of the different ones. Cost of analysis or test furnished on receipt of sample.

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Any concern intending to buy metals, machinery and supplies and desiring the names of the various manufacturers and sellers of these products can obtain this information by writing to THE METAL INDUSTRY. Our Information Bureau is for the purpose of answering questions of all kinds.

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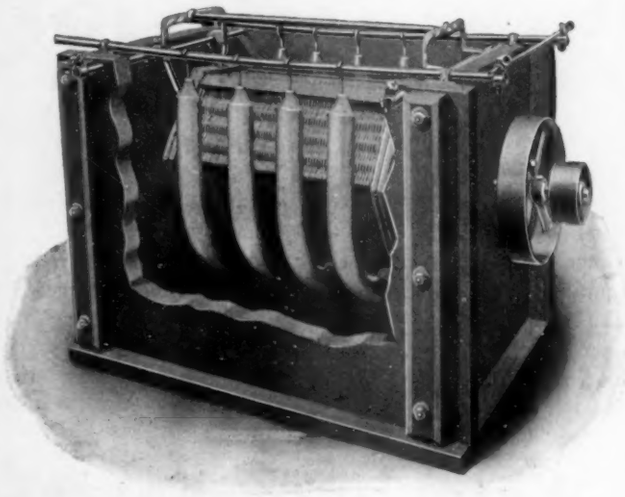
When visiting New York the out-of-town friends of THE METAL INDUSTRY are invited to make our office their headquarters, where writing desks and telephone service will be at their disposal. Every one interested in the non-ferrous metals is invited to call.

THE METAL INDUSTRY, 61 Beekman Street, NEW YORK

Mechanical Electro-Plating Apparatus

PATENTED JUNE 22, 1897, FEBRUARY 24, 1903, OCTOBER 11, 1904. OTHER PATENTS PENDING.



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We will furnish sample lots of work without charge.

This apparatus is a proved money saver where small work is to be plated. Can be used in Nickel, Copper, Brass, Zinc and Silver Solutions.

No Stringing. No Wire Used.
No Metal Plating Trays or Baskets.
No Unstringing. No Loss of Metal.
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Basket can be removed at will—without interfering with drive. In larger sizes basket is raised and lowered automatically.
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With our **Basket Anode** either Grain Nickel or Scrap may be used.

These Anodes are practically indestructible and the first cost is very reasonable.

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Back of Anode

American Nikeloit & Mfg. Co.
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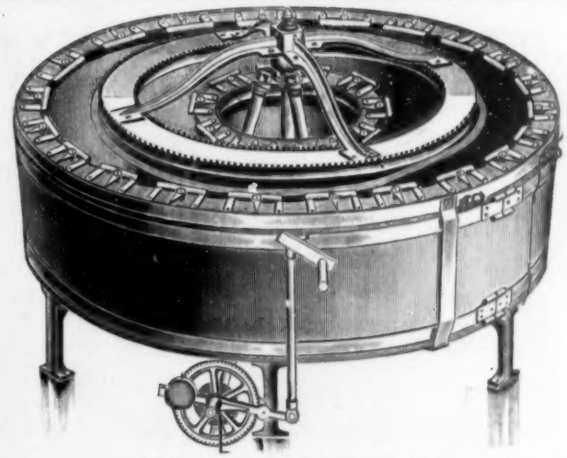

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BY USING OUR

MECHANICAL ELECTRO-PLATING TANKS.

Produce better work at lower cost than any other method.
No spoiled work.
Can be used with any kind of plating solution.

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Tanks have been in use ten years.
Write for catalog, prices and particulars.
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Furnished in either Round or Rectangular style.

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A Power Sprue Cutter Will Hustle Work Through

This machine will cut with ease a sprue ¾ inch square or the equivalent.

It is easily operated. Simply hold the foot treadle down till the work is finished.

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The best, because the most effective. No "gumming up" of wheels, quick cutting and satisfactory in every way.

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